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AND JOURNAL OF CITY AND VILLAGE AFFAIRS.

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WELCOME.

City officials and friends of City Government are cordially invited to make the offices of City Government their headquarters during their visit in either city. Desks, stenographers and stationery are placed at their disposal, and their mail may be addressed in our care.

PROFITS OF ADVERTISING.

There seems to be an implied agreement among persons engaged in certain lines of business to avoid the appearance of competition, and thus escape the expense of advertising. Being without experience, they do not know that the wresting of trade from rival establishments is not the only effect of the publication of business announcements. One of the results of advertising is to increase the total volume of trade. Most people have to be frequently reminded of their own needs and duties. The cost of judicious advertising is small compared with the profits.

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Editorial Comment.

He is an unwise city official who does not read "City Government" regularly.

* * *

The star of the shirt waist city official is in the ascendency in these days of torrid heat.

* * *

Would not an anti-spitting-on-the-sidewalk-and-in-public-places ordinance be a good thing in your town?

* * *

Would it not be worth while for the city official to devote a little more grey matter to his duties and less to politics just about now?

* * *

The Hon. Bird S. Coler says the Ramapo octopus of New York state furnishes a good live issue for local politics. That is no fairy tale.

* * *

Forty-two owners of buildings unprovided with fire escapes were arraigned before a Chicago justice the other morning. Are you attending to such matters in your city, Mr. Mayor?

* * *

Do not forget to send your advance reports to "City Government"—including water works, fire, police and so forth. Do not wait for the printed report; give it to us while it is fresh.

* * *

Would it not be more conducive to the health, long life and happiness of your constituency, Mr. Mayor, if you would give more attention to the enforcement of the ordinances of your city and less to the patching of your political fences?

* * *

Are you sure, Mr. Mayor, that all the poles—telegraph, telephone, electric light and street railway—in your city are in a sound condition? It is bad enough to have them mar the good looks of the street, without endangering human life. Poles which are rotten at the base become a menace to human life in every heavy storm.

* * *

O'Flaherty, from the 5th: "Mr. Prisidint, I nomynayte Thomas McCullough fur wan ov thim."

The President of the Council: "One of them what?"

O'Flaherty: "I do' 'no. Wan ov thim what ye're maakin'."

This actually occurred in a City Council not long ago.

* * *

The city official is not half so bad as he is painted.—"City Government."

And a decayed egg does not smell to heaven until after its contents have been investigated.—Albany "Press-Knickerbocker."

It is no disgrace for a city to find a ——— official among the faithful, but it displays a frightful bad taste to keep him—even on ice! Any in your refrigerator?

September is the favorite convention month, on which account more than the usual amount of space is given to convention work in this number. Several valuable papers will be found elsewhere in this issue. To make room for them we were obliged to omit several departments.

* * *

The Hon. James K. McGuire of Syracuse, N. Y., who, for months, has been persecuted by his opponents, has won out again. Charges against McGuire were presented to the Governor some weeks ago. Attorney General John C. Davies, after due consideration, declares the charges have not been sufficiently substantiated to justify the Mayor's removal.

* * *

TO OUR CONTEMPORARIES:

When giving credit for articles quoted from "City Government," editors will confer a favor by always using quotation marks in connection with the title of our journal, as indicated above, unless the full title is used: City Government and Journal of City and Village Affairs. This will avoid confusion in the mind of the reader, as, without quotation marks, the term, "City Government," is often thought to mean the local aministration.

* * *

AKRON'S DISGRACE.

The city of Akron, O., stands disgraced in the eyes of the Nation because of the interval of mob rule on the night of the 23d of August. Disgraced, not only by its disreputable citizens who composed the mob, but by the inefficient police force and cowardly action of the authorities in railroading the criminal to prison.

There seem to be no extenuating circumstances to lessen the enormity of the crime of the mob. The attack was not due to the sudden frenzy of men who have caught their victim red-handed. There had been time for reflection and the exercise of good judgment; time enough for everyone concerned to know of the criminal's arrest.

The attack upon the law was, therefore, premeditated and therein just so much worse than similar uprisings in the South.

The officers of the law feared violence and wisely removed the prisoner out of harm's way, but refused to let the fact be published in the daily press. Ample time and opportunity were afforded, but the officials chose the unwise course—secrecy. Had they done otherwise, there would have been no shedding of blood, Herein they made a great mistake.

In the next place, there was no preparation on the part of the police to meet the disturbance which was feared.

Finally, after the city had suffered bloodshed, death, loss of property, and disgrace at the hands of the mob, the authorities secretly hustled the negro back from Cleveland and railroaded him to prison. This was a shameful truckling to mob rule, an act of cowardice and a travesty on justice—which will leave a stain on Akron's honor deeper than the previous disaster.

While nothing can be said in extenuation of the mob's work, this much may be said for the police force. It is wholly inadequate in numbers and equipment, even for protecting the city under ordinary circumstances. The department has been run for years on the penny wise and pound foolish policy, besides being badly influenced by politics. These combined, are sufficient causes to produce icompetency in any force of men.

"CITY GOVERNMENT HANDBOOK NO. 1"

will soon be issued by the City Government Publishing Company. "Public Water Supplies From Driven Wells" will be its title. Our readers will readily recognize in this the serial which has been running in our columns since April. Mr. Kuichling, its author, needs no introduction to "City Government" readers," as he is a recognized authority in the engineering world.

After months of research among works new and old, domestic and foreign, the author has brought together from these sources and his own large fund of information, an aggregation of facts the like of which has never before been placed between two covers on this side of the Atlantic.

The hand-book will be made to fit the pocket; durably bound in cloth; and, above all, will contain, besides a marginal index, one in the back which will enable a rapid reference to any phase of the subject treated. This will be invaluable to water commissioners, those engaged in the driven well business and all others interested in the question of a pure public water supply.

Advance orders are now being received; price, fifty cents per copy.

* * *

VOTING MACHINE HAS ROOM FOR ALL.

There have been a number of newspaper yarns of late which have brought into question the sufficiency of the capacity of the voting machine. It will be impossible, it is maintained, to accommodate all the National parties in the field.

"City Government" referred the matter to the United States Voting Machine Company of Jamestown, N. Y. The reply of the general manager, Mr. Daniel B. Platt, leaves no room to doubt the ability of the machine to provide for all parties. He said:

"Referring to comments of newspapers regarding the capacity of voting machines, experience proves that there need be not the slightest alarm concerning the ample capacity of the voting machines in the coming presidential election.

"The same sensational question has been raised preceding every presidential campaign since voting machines have been used in presidential elections, viz.: in 1892 and 1896.

"The same ante-conditions existed then, showing nearly the same number of uncertified nominations as at present, most of which failed, (as they will again), to comply with the wise provisions of the law, designed to protect the taxpayers against expense of printing ballots, etc.

"At the present writing, only four parties are entitled to a place on the blanket ballot, or on the voting machine. In the history of the country, no presidential election has been held that would have required the full capacity of the voting machine under their usual adjustment, and there will be ample capacity this year. However, to dismiss the fears of those who suppose there will be ten or more parties duly certified, we can say the voting machine can and will be adjusted to accommodate them."

METHODICAL ADVERTISING.

In most lines of business the successful and methodical man considers the amount paid for advertising as a part of the necessary capital of the enterprise. Just as he figures out what his stock should cost, so he estimates the value of the trade to be gained by advertising, and what he should expend for it.

Personals.

—Mr. John Mulva is the new Mayor of Oshkosh, (Wis.) succeeding the late J. H. Merrill.

—The Council of Steubenville, (O.) has elected Mr. William R. Wilkin City Clerk, vice Mr. George P. McCracken, resigned.

—Mr. J. D. Casey has been appointed Commissioner of Public Safety of Rochester, (N. Y.) by Mayor Carnahan, vice Mr. Cutler, resigned.

—Mr. Adolph H. Goetting has been appointed Commissioner of Charities for the Borough of Brooklyn, by Acting Mayor Guggenheimer of New York City.

—Mr. James F. Beard of Somerville, (Mass.) president of the School Board and cashier of the Somerville National Bank, has been elected Treasurer of the city.

—Mayor Hugo has finally been declared Mayor of Duluth, (Minn.) after a protracted fight in the courts. The Supreme Court has announced its decision in his favor.

—Alderman Gallery of Montreal, (Can.) recently was presented with a magnificent clock by the members of the Congregational church of that city as a mark of their esteem.

—Hon. J. Seymour Toner, Mayor of Green Island, (N. Y.) and Corporation Counsel Deal have distinguished themselves by bringing the Street Railway Company of that city to their terms.

—Acting Mayor Guggenheimer of New York is marrying a large number of couples during the absence of Mayor Van Wyck. His only fee is a kiss, and he collects it from all, whether white, black or a heathen Chinee.

—Commissioner of Public Works Martin Maher of Buffalo, (N. Y.) died at Atlantic City, (N. J.) August 2, 1900. Mr. Maher had gone in search of health. His official life commanded the respect of his fellow citizens, who mourn at his untimely death.

—The Rev. Dr. Washington Gladden, the Member of Council from the Seventh Ward, Columbus, O., has not yet accepted a penny from the city for his services as Councilman. He draws his pay each month, but instead of accepting the warrant for the same, indorses it back eo the general expense fund.

—Mayor Zimmerman of Sandusky, (O.) has enforced the Sunday closing saloon law. He says that as the Reform Committee insists upon Sunday closing of saloons, he will cause the arrest of every violator of the Suday common law. This, it is said, will affect the pocketbooks of some of the members of the Reform Committee.

—Mr. Martin A. Gemunder, secretary of the Sinking Fund Trustees of Columbus, (O.) has donned the shirt-waist. He was refused service at a restaurant the other day unless he put on a coat, which he refused to do, and left without his luncheon. "I don't care for being fired out, but I am so much in favor of the shirtwaist and this may prove a set-back to its popularity," explained Mr. Gemunder to a reporter.

—The Council of Brazil, (Ind.) at a recent meeting voted to increase the salaries of the City Clerk and Treasurer to the extent of $75, and that $100 be added to the Mayor's salary. Mayor Bailey, who was present, surprised everybody by declining the increase. He said that the taxpayers, as well as himself, knew what the salary was when he accepted the office, and it must remain at the original figures so long as he is Mayor.

—Mr. Ralph W. Pope, secretary of the American Institute of Electrical Engineers, who is now in Paris, expects to return to New York city about September 15.

—City Clerk Boyd of Spokane, Wash., has compiled a neat manual for 1900-1901, of 30 pages, containing a grist of information about that progressive city of the Pacific slope.

—Ex-Mayor George E. Green of Binghamton (N. Y.) has been nominated for the State Senate by the Republicans of the Thirty-eignth district, which includes Broome, Tioga and Cortland counties. It is Republican by 6,000.

—Mr. George S. Pierson, Mem. Am. Soc. C. E., of Kalamazoo, Mich., has been engaged by the City Council of Marshalltown, Ia., to prepare plans for a sewage disposal plant for that city. It will have a capacity of 2,000,000 gallons per day. A pumping station will be required.

—Mr. George C. Sikes, formerly an editorial writer on the Chicago "Record," has severed his connection with that paper and accepted the position of secretary to the Street Railway Commission, recently appointed by Mayor Harrison to study the street railway problem of Chicago and endeavor to find a solution.

—Chicago is to elect a Mayor in April. Graeme Stewart, Illinois member of the Republican National Committee; John M. Harlan, William Boldenweck, Judge Elbridge Hanecy and William J. Moxley are among the prospective claimants for the Republican nomination. President Boldenweck of the Sanitary District Board claims the largest German support. Friends of Judge Hanecy say that Congressman Lorimer at the Peoria Convention pledged his support to the Judge for the city nomination. Judge Carter's friends on the North Side are favorable to ex-Alderman Harlan.

—Mr. B. F. Stevens of Spirit Lake, Ia., recently appeared before the town Council and modestly asked it to receive, on the part of the town, the complete power plant and light and heating system, which he has built at a cost of about $30,000. There were no strings to the gift. There is no debt to pay, no service to promise. The property is practically new. It has all been built of the best material. There is at the power house a vast surplus of power that may be used to promote public interests. Under intelligent and progressive direction this gift may be largely beneficial to the town.

Convention Dates.

SEPTEMBER.

12-13.—New Jersey State Firemen's Association, Atlantic City, N. J.

22-26.—National Prison Association, Cleveland, O.

24-27.—National Civic Federation, Chicago, Ill.

25-27.—International Association of Municipal Electricians, Pittsburg, Pa.

26-28.—Virginia State Firemen's Association, Richmond.

OCTOBER.

2-5.—Pennsylvania Firemen's Association, New Castle.

4-5.—National Firemen's Association, East St. Louis. Ill.

9-12.—International Association of Fire Engineer's, Charleston, S. C.

—.—Indiana Municipal League, Richmond, Ind.

22-26.—American Public Health Association, Indianapolis, Ind.

DECEMBER.

12-15.—League of American Municipalities, Charleston, S. C.

General Items.

It is now "Greater Topeka." The city has added 150 acres to its territory.

* * *

Governor Roosevelt will announce the fate of District Attorney Asa Bird Gardner shortly after September 1.

* * *

Mayor Driscoll is at the head of a movement in New Haven, (Conn.) for checking the decay and death of the city's trees.

* * *

Mayor Van Wyck of New York has been enjoined to explain his connection with the ice trust. His reply will be awaited with interest.

* * *

Mayor Stirling of Bridgeport, (Conn.) maintains that all sprinkling of streets should be paid for by the property owners on the assessment plan.

* * *

The Council of Richmond, (Va.) is considering a proposition for placing 1,000 receptacles for waste paper, fruit peelings and so forth about the streets.

* * *

The City Council of Jacksonville, (Fla.) has passed a resolution which places it in the list of candidates for the location of the seat of the State government.

* * *

The Cleveland, (O.) Council has passed an ordinance appropriating the sum of $100 with which to provide its members with badges, to be worn on "State" occasions.

* * *

The street car strikers of St. Louis are going to have a street railway of their own. Articles of incorporation have been filed by the Labor Union Street Railway Company.

* * *

It is a cold day when Dame Boston cannot furnish something new and interesting. This time it is a pneumatic tube service. When completed January 1, 1901, it is expected, it will be the largest in the world, with an annual capacity of 5,000,000 messages.

NEW HAVEN COMPANY ESTABLISHES A PRECEDENT.

On August 1 the Winchester Avenue Railroad Company of New Haven, (Conn.) issued an edict which prohibits passengers from riding on the running board of a car or from standing between the seats of a car on its system. This is an entirely new departure in street railroading, and the outcome will be watched with great interest throughout the country. The conductor is given to understand that just as soon as all seats in the car are filled he must refuse to take on even one more passenger until a seat is made vacant by a passenger getting off. It must be said, however, of the new ordinance that it is a little severe on the motorman. He is required to keep a sharp lookout and to know when there are no vacant seats. As soon as his car is full, he is to proceed until signalled by the conductor to stop, or in case of an emergency. If passengers be waiting for the car, he is to slow up, not stop, and request them to wait for the next car.

Fifty Cents a Copy will be paid for a few copies of City Government, August and November, 1896.

FRANCHISE WITH A "STRING" ATTACHED.

The Council of Morristown, (Ind.) has granted the right of way to a Traction Company with a "string' 'attached. It binds the company to have the entire line in operation by January 1, 1902, and work must begin within six months. In addition, the company must furnish free street lighting for the town, and must locate the power house here. It is also required to furnish electric light for such customers as may require it. The company is also required to improve its own roadway between tracks.

HOW THEY GROW.

The Census Bureau is hard at work, grinding out the totals showing the population of the largest cities. In the list below will be found all that have been announced up to August 31:

Cities.	1900.	1890.	Percentage of increas.
New York	3,437,202	*2,492,591	37.90
Chicago	1,698,575	1,099,850	54.44
Philadelphia	1,293,697	1,046,964	23.57
St Louis	575,238	451,770	27.33
Boston	560,892	448,477	25.07
Baltimore	508,957	434,439	17.15
Cleveland	381,768	261,355	46.07
Buffalo	352,219	255,664	37.77
San Francisco	342,762	298,997	14.64
Cincinnati	325,902	296,908	9.77
Pittsburg	321,616	238,617	34.78
New Orleans	287,104	242,079	18.62
Milwaukee	285,315	204,486	39 54
Washington	278,718	230,392	20.98
Jersey City	206,433	163,003	26.64
Louisville	204,731	161,129	27.06
Minneapolis	202,718	164,738	23.05
Providence	175,597	132,146	32.88
Indianapolis	169,164	105,436	66.44
Kansas City, Mo.	163,752	132,716	23.39
St. Paul	163,632	133,156	22.89
Rochester, N. Y.	162,435	133,896	21.31
Denver	133,859	106,713	25.44
Toledo, O.	131,822	81,434	61.88
Allegheny, Pa.	129,896	105,287	23.37
Columbus, O.	125,560	88,150	42.44
Paterson, N. J.	105,171	78,347	34.24
Omaha	102,555	140,425	†26.98
Wilmington, Del.	76,508	61,431	24.54
Hoboken	59,364	43,648	36.01
Kansas City, Kan.	51,418	38,316	34.19

*Approximate. †Decrease.

CHICAGO'S JUVENILE COURT.

The Juvenile Court of Chicago has been in use a year. The citizens are greatly interested in its operation and much pleased with the result of its workings. It is not the only one in the country, for the city of Rochester has had a Juvenile Court for five or six years, and has been much pleased with it.

During the first year's operation of the Chicago court, 2,298 children were brought before Judge Tuthill, and of these, 1,100 were paroled to the probation officers. Only 15 per cent. of these have been returned to the court for a second hearing. Hundreds of children who have been guilty of some little offense for the first time have been reprimanded, but not punished, and have been started on the road to reform.

Through the agency of the court, children have been taken from evil environment that has been the cause of their misdemeanors, and placed in better surroundings. Those whose conduct has not justified such treatment have been sent to institutions, but not branded with a criminal sentence. Of the number sent to the John Worthy School less than 3 per cent. have come again before the court for a second sentence, after they have been released. Judge Tuthill considered that it was his duty to endeavor to reform children and bring them back to a useful life, rather than to punish them.

Report of New York Merchant's Association.

The excellent work which a public spirited body of citizens may accomplish for the enlightenment of the community has had few better illustrations than the volume which the Merchants' Association of New York has just published on the subject of the water supply of the city. The incitement to a thorough, unofficial, unpartisan investigation of the subject was the development of the Ramapo job. This scandal has become in the progress of events one of the very important issues before the people of the state, so important that it may, under certain not impossible conditions, determine the result of the state election and influence the national election. The publication of this full report is opportune. It supplies the basis of fact upon which an intelligent judgment of the character of the Ramapo job can be formed. Its selfishness and extravagance are presented clearly, in contrast with what may be accomplished by judicious continuance of the policy of municipal ownership.

But the Merchants' Association is a body of taxpayers representing both parties, and having great interest in preventing municipal extravagance and robbery that means no public advantage. Their interests as citizens are opposed to the interests of politicians who are in politics for plunder. They have taken hold of this subject with an earnestness that is attested by an expenditure of more than $33,000, to gather and set forth the facts that reveal the wastefulness of the project of the ring. In the prosecution of their work they have employed engineers and experts of the first order of ability, and made a comprehensive survey of the possibilities of an adequate extension of the supply by municipal ownership and control instead of by private monopoly, which, if once fastened upon the community, would be as selfish as the ice trust and unlikely ever to be thrown off. Not only have the engineering problems been investigated, but committees have investigated and reported upon legislation, municipal finance, public policy and fire protection and insurance. Indeed, no phase of the subject has been neglected.

It is conceded that an additional water supply will soon be needed, unless the present enormous waste can be prevented. The policy of the political ring is to promote waste in order to make scarcity and to do anything else to create fear of a water famine. Thus the supply of the Brooklyn public schools was cut off, and the householders and manufacturers have been inconvenienced unnecessarily, while hundreds of millions of gallons are allowed to run to waste in various ways. In the judgment of the New York newspapers, it is all a part of the plot to force a prompt contract with the Ramapo Company, which has got control of all nearby sources of supply, including a great part of that available in the Catskill country. The only other large available supply is that of the Adirondack region, to be brought to the city by way of the Hudson river. The sources in the Catskill country owned by the Ramapo company are believed to be capable of furnishing about 260,000,000 gallons daily, and the entire Catskill watershed not over 460,000,000 gallons. The system which might be made tributary to the upper Hudson river is estimated to be capable of supplying 1,500,000,000 gallons daily, which would be ample for a long period in the future. This is the supply which the Merchants' Association recommends to be taken by the city.

It comprises all the streams flowing into the Hudson river above Poughkeepsie, especially those of the Adirondack mountains. The plan contemplates having this water brought in the upper Hudson to Poughkeepsie, filtered there and turned into an aqueduct for conveyance to reservoirs in the upper part of New York. Beginning with an additional supply of 250,000,000 gallons daily, which would suffice for perhaps twenty years, it is believed that the ultimate available supply will suffice for a population of 18,000,000. This would contemplate the building of large storage reservoirs in the Adirondacks to preserve the surplus of freshets. The crucial question as between this means of public supply and supply by a private company is, of course, that of expense, not only immediate expense, but ultimate cost or profit.

Upon this point the New York "Evening Post" remarked:

The economy in such a system of extending the supply under city control, as contrasted with the extravagance of the Ramapo scheme, is clearly proved. Under the former plan the report estimates that there would be an annual deficit, beginning with about $1,800,000 in 1906, and diminishing to about $104,000 in 1917, to be succeeded then by profits steadily increasing and reaching $3,100,000 a year by 1945, when the Ramapo contract would terminate. The excess of the later profits over the earlier deficits would be about $48,000,000 between 1906 and 1945, and by 1937 the city would own its plant free from debt under the municipal system, while it would own nothing under the Ramapo system. Moreover, the proposed Ramapo contract, involving the payment to the company of $70 per million gallons, less the revenue from consumers of $50.29 per million gallons, would result in a deficit to the city of over $60,000,0000, swelling the loss to the municipality from $48,000,000 to $108,000,000 in the forty years ending with 1945. Besides, the city would own no plant under the Ramapo system, while, under the municipal ownership plan, it would have paid for its plant by 1937, further increasing the total cash and property loss to $145,000,000 on a system supplying only 250,000,000 gallons daily. Finally, if the Ramapo job were put through, another system would have to be constructed by 1920, the extra cost of which between 1920 and 1945 is put at $50,000,000, making the grand total of loss to the municipality the vast sum of $195,000,000.

SUPERINTENDENT FRANK C. MASON,
at his desk in new headquarters, Brooklyn, N. Y., with "City Government" at his right hand.

New Quarters for Brooklyn Police Telegraph.

The accompanying half-tone of Mr. Frank C. Mason, superintendent of the Brooklyn police telegraph, shows him at his desk in the new quarters of the bureau. In plain view, at his right hand, will be noticed a copy of "City Government," for which Mr. Mason expresses a high appreciation.

The transferring of the wires, switchboard and office paraphernalia of the police telegraph system of the borough of Brooklyn was completed on July 25 without a break in any of the wires or a lost call. This was an excellent piece of engineering when taken in consideration with the fact that the old switchboard was transferred in sections from former headquarters in the Municipal building to the building formerly occupied by the New York and New Jersey Telephone Company at 16 Smith street. The old operating room of the latter company is now being used as the operating room for the police telegraph. The side walls are of black walnut and so arranged as to kill as far as possible all acoustic properties. As now arranged, it is said to be the most complete police telegraph operating room in the world. The entire system embraces 560 miles of wire, mostly underground or on the elevated railroad in cables, 469 police signal boxes and 500 telephones.

During the past year the operators at headquarters handled 209,426 messages. The patrol wagons brought in 44,826 prisoners and 1,425 lost children. The hourly reports received during the year numbered 2,463,211 and, besides, 16,241 messages were sent to men on post. There were 14,562 dead animals reported by men on post and 9,321 ambulance calls.

Associated with Mr. Mason at headquarters are: Thomas Williams, chief operator; Messrs. James Keenan, James Campbell, Julius Zeidler, R. F. Conklin, William Miller, Thomas O'Brien and Frank Edwards, operators; Andrew J. Smith, clerk; Messrs. August Manee, William McConnell, P. J. Higgins, Charles Wagner, Charles Rorke and James Doherty, linemen; John Ambler, driver.

The Chicago Street Railway Commission.

(Special to "City Government.")

Chicago is attempting to deal with the street railway problem in a systematic manner, in striking contrast with the practice of that city in dealing with the same and similar problems in the past.

The franchises for the main lines of the street railway in Chicago begin to expire in 1903. In anticipation of that event the companies have been seeking to secure renewals on terms favorable to themselves, but thus far without success. An attempt was made in 1897 to secure 50-year extensions of franchises by direct act of Legislature, but the movement was beaten by the popular outcry against it. That same Legislature, however, did pass a law, known as the Allen law, designed to make the task of the companies in negotiating with the Council easier. In response to public sentiment, however, that law was repealed by the Legislature that met two years later, before any grant thereunder had been made by the Chicago City Council.

Before very long, however, the entire question must come up for settlement. With a view to being prepared to meet the problem intelligently when it should come up again, the Council, last year, authorized the appointment by the Mayor of a commission, or special committee of of seven aldermen, to study the subject and to make report thereon. Little was done at first because no money had been appropriated for the use of the commission. This oversight was remedied in the appropriation ordinance passed in March last and, shortly afterward, a secretary was chosen who is expected to give all his time to the work. The members of the commission are Milton J. Foreman, William S. Jackson, William F. Brennan, Walter J. Raymer, Ernst F. Herrmann, Julius Goldzier and William Mavor. The secretary is George C. Sikes, who, previous to his selection, had been an editorial writer on the Chicago "Record."

The commission is making a study of the street railway problem with a view to presenting to the Council a plan of action for dealing with the subject when it shall come up for final determination. As further legislation is considered essential to any right solution of the problem the commission, in all probability, will report, among other things, the draft of a bill for submission to the state Legislature that convenes in January next. The commission is also giving considerable thought to the subject of subways or underground railways. It appears to be the judgment of the members of the commission that underground tracks in the heart of the city are necessary to relieve the congestion in the crowded business district. It is considered probable that underground roads for the accommodation of street cars that enter the heart of the city will be recommended, in which event all surface tracks will be ordered removed from the district in which underground lines are constructed.

BLOW TO THE UNION LABEL.

The Grady union label ordinance, passed by the City Council of Atlanta, (Ga.) some time ago, which required that all the city printing should bear the union label, has been declared illegal by the Supreme Court of Georgia. The court also held that such a procedure would tend to encourage monopoly and defeat competition. The decision is one of the most important handed down by the court this session, as it involves the right of any city to pass such an ordinance as was adopted by the City Council at Atlanta.

Uniform Accounting and Municipal Statistics.*

By M. N. Baker,
Associate Editor "Engineering News," New York City.

Whoever follows municipal affairs closely and intelligently must be impressed with the enormous waste of human energy and life, to say nothing of time and money, due to the failure of cities to profit by the experience of other municipalities and to record their own experience in such a way that it may serve as a future guide to themselves and their neighbors. This fact has been recognized by most of the societies devoted directly or indirectly to city problems, with the result that some of them have appointed committees to frame schedules for uniform annual reports and others have created committees to secure collection of municipal statistics on a large scale by the United States Census Bureau, or by some other agency of the national government. Your own association, through its Committee on Municipal Data and its special committee on municipal statistics in the next census, is working on each of these lines. The chief difficulty in the way of securing comparative municipal statistics is an utter lack of uniformity in municipal accounting, and worse yet, in many cities, an absence of any sort of bookkeeping worthy the name. It is unusual for any two departments of one city to have the same general system of accounts; rare indeed for similar departments in two cities to follow the same plan; and practically unknown for any two American cities to have similar sets of books through all their various bureaus and branches of government. Assuming that we are all of one mind as to the lack and the need of uniform accounts and the advantages of national municipal statistics let us pass at once to a consideration of the best means of securing each.

First of all, we must rely on state rather than national action to bring about the needed reforms in municipal accounting. In fact, with proper state supervision and audit of municipal accounts, with returns to each state by its several municipalities and the publication of those returns as state documents the need of national action would be reduced to a minimum, the department of municipal statistics at Washington being a sort of national exchange for the several states. The work of the state would be constant and its published reports annual, while the great exchange of the nation's capitol might issue summaries at longer but regular intervals. The idea I have in mind was well expressed a few weeks ago by Professor Charles Hull, of Cornell University, who said the several states might form registration bureaus for recording the flow of the municipal stream, while the general government took cross-sections at fixed, recurring periods.

There are two general lines of possible state action to the end in view: (1.) Special commissions, each in charge of a single class of municipal activities, like some of our street railway commissions, or the Massachusetts Gas & Electric Lighting Commission; and (2.) general boards of municipal control, as was proposed in a bill introducted in the New York Legislature a few years ago. Either of these plans involves not only an oversight of accounts, but more or less supervision of municipal methods; and even technical advice, as is given by the Massachusetts and Ohio state boards of healths. An intermediate plan is a state examiner, an auditor of public accounts, such as has existed in Wyoming since its adoption of a constitution and admission as a state.

I am not going into the merits of these plans, further than to say that all branches of municipal activity need some central supervision and that greater harmony and unity between the various branches might be expected under one general state board, either of control or audit, than under a number of such boards. One of the greatest drawbacks to municipal progress in America, I may add, is a lack of co-operation between city departments. Our cities do not act as units, but as aggregates of units, each of the many branches or bureaus struggling, as indeed it must under the circumstances, to get its share of the appropriations, like so many pigs at a trough—and sometimes "it's the still sow that gets the swill."

Instead, then, of discussing what sort of state bureau can best serve the end in view let us consider what information municipal accounts and reports should contain. It is the function of societies like this to indicate, after careful investigation, what information engineers and other municipal officials need, leaving it for expert accountants to draw up the necessary systems of bookkeeping. I may say, though, that special stress needs to be laid upon having all accounts discriminate between cost of construction, operation and capital charges, and that the latter should include sinking fund and depreciation.

Your committee on municipal data has already laid before you carefully prepared schedules for reports on water works, sewerage and pavings. I desire to call your attention to the fact that water works schedules were prepared some 14 years ago by both the American and New England Water Works associations, and that a number of cities in New England, New York, Ohio and Michigan, have made use of the New England schedules for years. Obviously, we shall not secure uniformity if each of the various societies adopts a form of its own, with little or no regard to the other. The action of these three societies, in this particular respect, was not intended to be diverse, so far as I know, but nevertheless they have not acted in concert. The three forms have much that is practically identical, and their aim is the same, uniformity, and thus comparability. Inasmuch as the Central States Water Works Association will discuss this general question at its meeting at Columbus next week, and the New England Water Works Association holds its annual convention at Rutland the week following, your society has an opportunity to take a long stride towards uniformity by devising some plan for combined action, so that hereafter there will be one, instead of three, or possibly four "uniform" schedules for summaries of water works statistics. The fact that the New England water works schedule is the only one thus far put into use, even though adopted by a comparatively few cities, entitled it to careful consideration by the other societies. It would be surprising if it did not need alteration or extension at some points, to meet the changes in waterworks practice during the past 14 years, but we might congratulate ourselves if half the water works of the country presented anything

*(A paper prepared for the annual convention of the American Society of Municipal Improvements, Milwaukee, Wis., Aug. 28 to 31, 1900.)

like so complete a summary as this in their annual reports. By far the greater number of water works in the United States are in cities of 20,000 and under, where for many years to come it would be difficult to secure the voluntary adoption of elaborate schedules. I know there is much to be said in favor of providing very complete forms, not expecting the smaller places to use all of them, but over-elaborateness will lead many places to avoid these schedules altogether, rather than to select some portions of them for use. Then, too, if the smaller places adopt only portions of schedules, they will not all use the same parts, so that great diversity will still prevail. It should be remembered, too, that such schedules as are under discussion are designed as summaries of statistics, and not for the full body of accounts and records kept by water, sewer and other city departments. Uniform accounts, or bookkeeping, is quite a different thing from uniform summaries of the leading facts relating to a water works plant or sewerage system. Eventually we may hope for complete uniform systems of bookkeeping, but at the start we shall make more progress if we all agree on the leading items which it is desirable to include in the annual reports. In other words, the plan for voluntary action must be simple; the more elaborate schemes for uniform municipal accounts can be brought into general use through central state supervision, with a fair degree of compulsion available for use in some cities.

Of course this society will not stop its efforts at co-operation with water works reports. So far as I know, you are pioneers in formulating a scheme for reports on sewerage and paving, but there are other national societies interested in these subjects, to say nothing of the hosts of state and local engineering and other societies, each and all of which can do most effective missionary work with state legislatures and municipal councils, and their individual members. There are a number of societies devoted to special branches of municipal work, branches from which your actual membership is small, but your possible future membership is large—such as gas, electric lighting and street railways. In addition, there are economic and state associations, and still other societies devoted to the general problem of securing good government. What I hope to see is committees from every society interested in municipal affairs, each empowered to co-operate with the others to secure the formulation and adoption of uniform schedules for summarizing municipal statistics of all kinds, and eventually the establishment of uniform municipal accounting, under competent state supervision.

Under existing conditions the outlook for national municipal statistics of much comparative value is not encouraging, but the recent demand for such statistics, and the awakening to the deficiencies in municipal bookkeeping, are each hopeful signs for the future. Until we have a permanent census bureau, or a division of municipal statistics at Washington, it is useless to expect much from the general government, unless it be by an extension of the work of the United States Department of Labor. The department will soon publish its second annual bulletin, entitled "Statistics of Cities." These bulletins are now limited to cities of 30,000 population and upwards. They might well be extended to smaller cities. The statistics given are secured, for the most part, by agents who visit the cities in question. In no other way, it is said, can facts and figures of value be obtained, under the present heterogeneous condition of municipal accounts and reports.

What the Twelfth Census might do, is to place before the country a census proper, or mere count, of municipal activities, exhibiting in one comprehensive table the area of each city, its mileage of streets, paved and unpaved, of sewers, water works—and so on through the list, so that anyone could tell at a glance just what a given city had done in any line or all lines of municipal work. This would furnish a valuable basis for more detailed future investigations.*

*This particular plan for census work I outlined more fuly in an article entitled "Municipal Statistics in the Census of 1900," published in "Engineering News" for July 27, 1899. In the same journal for June 14, 1900, I discussed "Uniform Accounting a Prerequisite to National Municipal Statistics," and July 5, 1900, I reviewed the "Progress Towards Uniform Municipal Statistics and reports in the United States." Most of the opinions and facts presented in the articles named have not been repeated here, so the articles may be consulted by those wishing further suggestions relating to the subject of this paper, particularly the last article, which shows a surprising amount and variety of activity designed to secure uniform municipal statistics.

THE TOILET OF GREAT CITIES.

METHODS OF EXPENDITURES OF 40 AMERICAN CITIES, COMPARED WITH 14 ENGLISH CITIES.

By W. J. M'Cannel.

The modern city is a great household. Its daily ablutions, cleaning, sweeping, scavenging and putting to rights is as essential to the public health as is the same service in the smaller, domestic household. If these necessary sanitary operations are long omitted the "run-down-at-the-heel appearance" is the inevitable result, to say nothing of the propagation of moral and physical disease.

The past quarter of a century has witnessed remarkable changes for the better in steret-cleaning methods in American cities. Previous to this period no really serious attempt was made toward cleaning the streets of the chief cities, except, perhaps, a few of the more important business and residential streets. But now the spirit of modern cleanliness imbues most of our cities from 20,000 population and upwards.

New York and Chicago represent the antipodes of conditions in America. The former is the cleanest and the latter is the dirtiest city in the United States. The vigorous campaign of the late Colonel Waring against dirt in New York, the adoption of effective methods and the organization of the "white wings," furnished an example which has been more or less copied in every city in the country. In reality, the street cleaning reform dates from the time Colonel Waring was put at the head of New York's street cleaning department. It seems strange that Chicago, so progressive and modern in other matters, should still cling to the antiquated method of street cleaning. She has a thorough cleaning of her streets in the spring, upon which the greater part of the appropriation for street cleaning is expended, and the remainder of the year makes only a pretence at keeping clean.

Next to New York comes Washington. Superintendent Stutler is not only keeping the streets fairly cleaned, but is endeavoring to better methods and conditions by a series of experiments. In his report for the fiscal year ending in 1899, a special report upon experimental hand cleaning was made. The streets were cleaned by contract up to July, 1900, and the experiment was made for the purpose of demostrating which was less expensive, contract or city labor.

The sum of $15,000 was appropriated for this purpose. Preparatory to commencing the work July 1, 1898, a schedule of streets for daily hand cleaning, amounting to 308,512 square yards, was made. The force employed for cleaning this area consisted of 38 men, at a salary of $1.25 per day, and four horses and carts with drivers, at $1 per day each. The necessary outfit for doing the work was purchased, as follows:

30 bag carriers at $15 each	$450 00
200 bags, at 7½ cents.....	15 00
4 dozen hand sprinklers, at $5 per dozen	20 00
4 dozen shovels, at $7.20 per dozen.	28 80
12 dozen brooms, at $4 per dozen..	48 00
4 doxen clamps and scrapers, at $6 per dozen	24 00
Total	$585 80

The total area cleaned during the year was 75,356,385 square yards at a total cost, including the outfit and all incidental expenses, of $13,564.87, which is at the rate of 18 cents per 1,000 square yards.

The same labor, performed at the contractor's price for hand cleaning, would cost 32 cents per 1,000 square yards, or 14 cents more per 1,000 square yards than by day labor under the supervision of the city. At this rate the streets will be cleaned the ensuing year at a saving of $136,000.

It will be noticed, by a reference to the tables below, that Santiago de Cuba expends more than 12 times as much as New York city per 1,000 square yards! What should make the expense so much greater, when labor is paid at the rate of $1 per day of 11 hours, the writer is unable to explain, not having been on the ground. The data was furnished by the commissioner in charge of the Sanitary Department and no explanation was offered.

American cities have much yet to learn from English cities about the "cleansing of a city," as they term it over there.

The collection and disposal of garbage is usually included in the street cleaning department of the English city, which prevents an equal comparison of the two groups. But, when it is understood that the English city cleans all its streets, paved and unpaved, collects and disposes of its garbage at a less cost per mile than the American city pays for street cleaning alone, a fair idea of how much we have yet to learn will be given.

It may be said, however, that while English cities pay from 50 cents to $1.25 per day for labor, here the wage is from $1.25 to $2.00 for common labor. Moreover, the streets of the former are more uniformly smooth and perfect than are the latter, which would lessen the expense of keeping them clean.

The chief cause for the great difference in the cost for the same work is found in American politics. Here, an employee is sure of his job, as a general thing, only so long as his political pull is greater than the other fellow's, while over on the other side the premium is put on efficient service and the political pull has nothing to do with a man's tenure of employment.

Although the English municipal laborer is paid less per day than his brother in an American city, yet he is always sure of a job while he is able to do good work, and, if he be sick or disabled in any way he will receive half pay. Taken, year in and

year out, it is a question if the Englishman does not receive as much cash as the American, when the lost time between the jobs of the latter are taken into consideration. A fuller comparison of the two systems, political and non-political, would emphasize stil more the benefits to the taxpayer and the laborer from the adoption of the merit system in all American cities.

English cities use more machines than are employed on this side, which is another factor of lessening the expense.

A study of the following tables will confirm the foregoing statements:

TABLE No. 1.

CITY.	Area of city—square miles.	Total miles streets	Miles paved streets	Paved streets—square yards.	†Cleaned, day or night.
New York	308	2466	1643	*29,463,919	B
Chicago	188	3946	1348	*22,916,000	B
Philadelphia	130	1350	1080	*18,360,000	B
Baltimore	37	411	371	*6,307,000	B
St. Louis	61	873	82	1,910,019	N
Boston	43	489	369	6,971,886	B
Cleveland	33	565	149	*2,533,000	B
Buffalo	42	800	332	6,242,260	B
Cincinnati	38	620	349	*5,933,000	B
San Francisco	42	750	186	2,800,000	B
Detroit	28	515	267	4,942,277	B
Pittsburg	29	230	200	*3,910,000	B
New Orleans	196	1360	199	*3,383,000	B
Milwaukee	21	502	75	1,981,425	N
Washington	69	486	210	3,600,000	B
Louisville	21	286	155	*2,635,000	B
Minneapolis	53	789	100	*1,700,000	B
Kansas City	36	450	175	*2,975,000	B
Jersey City	12	201	100	1,767,000	B
Indianapolis	28	540	88	1,484,259	B
St. Paul	55	756	45	966,000	B
Rochester	16	325	119	2,039,467	B
Denver	50	800	22	*374,000	B
Providence	18	222	39	695,728	B
Omaha	24	350	82	1,785,635	D
Toledo	30	400	125	1,897,196	B
Columbus, O.	16	300	116	2,744,511	B
Syracuse	22	300	46	792,788	B
Allegheny	8	162	83	*1,411,000	B
Worcester	36	186	11	237,454	B
Nashville	10	165	159	*2,703,000	B
Scranton	23	171	17	341,068	B
Memphis	16	200	83	1,341,549	B
New Haven	22	200	71	*1,207,000	B
Albany	10	144	80	1,419,545	B
Richmond, Va.	5	116	23	*391,000	B
Grand Rapids	18	283	152	*2,584,000	B
Dayton	10	175	31	725,000	D
Santiago, Cuba	4	120	18	56,000	D
Toronto, Canada	17	259	181	3,171,230	B

†Abbreviations: D.—day; N.—night; B.—both.
*Estimated.

TABLE NO. 2.

CITY.	Total expenditures, 1899.	Cost per 1,000 square yards.	Cost per mile.	††Contract or city work.	†Machine or hand cleaned.
New York**	$3,366,879	$114	$2,049	Y	H
Chicago	328,637	14	243	Y	H
Philadelphia	533,745	28	494	X	B
Baltimore	220,000	34	593	Y	M
St. Louis	130,000	68	1,585	X	B
Boston	350,328	50	949	Y	B
Cleveland	61,751	24	414	Y	B
Buffalo	160,959	25	484	Z	B
Cincinnati	190,000	32	544	Z	B
San Francisco	192,000	68	1,032	X	B
Detroit	149,000	28	524	Y	B
Pittsburg	125,300	32	626	Y	B
New Orleans	78,000	23	391	Z	B
Milwaukee	83,132	42	1,108	X	B
Washington	148,000	41	704	X	B
Louisville	90,000	37	580	Z	B
Minneapolis	45,272	26	452	Z	B
Kansas City	35,000	12	200	Y	B
Jersey City	31,000	17	310	X	B
Indianapolis	38,000	25	432	X	B
St. Paul	30,420	31	676	Y	B
Rochester	76,417	37	642	Z	B
Denver	25,000	66	1,136	Y	H
Providence	45,092	64	1,156	Y	B
Omaha	18,716	10	228	Y	H
Toledo	37,413	19	299	Z	B
Columbus, O.	62,191	22	536	Z	B
Syracuse	80,445	101	1,748	Z	B
Allegheny	20,000	14	240	Y	H
Worcester	11,444	48	1,040	Y	B
Nashville	32,000	11	194	Y	B
Scranton	12,000	35	706	Y	H
Memphis	41,000	30	494	Y	H
New Haven	75,000	62	1,056	X	B
Albany	41,536	28	519	Y	H
Richmond, Va.	54,827	140	2,383	Y	B
Grand Rapids	43,000	16	283	Y	B
Dayton	12,394	17	398	Y	B
Santiago, Cuba	80,000	1,428	4,444	*	H
Toronto, Canada	50,900	16	281	Y	B

*Under supervision of military government.
**From 1898 report.
†Abbreviations: M.—machine; H.—hand; B.—both.
††X.—work by contract; Y.—by city; Z.—by both.

TABLE NO. 3.

CITY.	Area of city, square miles.	Total miles streets	Paved streets, square yards.	*Cleaned day or night.
Glasgow	19.8	315	11,088,000	B
Liverpool	20.6	428	11,299,000	D
Manchester	20.1	684	8,221,248	N
Belfast	22.9	225	5,940,000	B
Bristol	18.0	270	3,400,000	D
Edinburg	13.7	165	4,244,888	B
Bradford	35.5	208	5,491,200	D
Nottingham	17.0	185	4,742,133	B
Dublin	5.8	126	3,315,288	B
Hull	14.4	115	3,000,000	B
Newcastle-on-Tyne	8.5	171	4,514,400	B
Salford	8.0	154	2,372,842	D
Dundee	6.4	77	517,000	B
Melbourne, Aus.	9.0	127	3,710,000	D
Sydney, N. S. W.	4.0	110	416,030	B

*Abbreviations: D.—day; N.—night; B.—both.

TABLE NO. 4.

CITY.	Total expenditures, 1899.	Cost per 1,000 square yards.	Cost per mile.	†Contract or city work.	*Machine or hand cleaning.
Glasgow	$365,595	$32	$1,160	Y	B
Liverpool	207,925	18	485	Y	B
Manchester	222,638	27	325	Y	M
Belfast	159,100	26	707	Y	M
Bristol	88,400	26	327	Y	B
Edinburg	248,895	58	1,508	Y	B
Bradford	64,070	11	308	Y	B
Nottingham	40,609	8	219	Y	M
Dublin	59,300	17	470	Y	B
Hull	64,580	21	561	X	B
Newcastle-on-Tyne	90,000	19	529	Y	B
Salford	78,430	33	508	Y	B
Dundee	65,000	125	844	Y	B
Melbourne, Aus.	75,000	20	590	X	M
Sydney, N. S. W.	135,000	..	1,227	Y	B

*Abbreviations: M.—machine; H.—hand; B.—both.
†X.—work by contract; Y.—by city; Z.—by both.

(To be concluded in October.)

Street Car Fares in 136 Cities.

William S. Poppleton, Esq., of Omaha, Neb., had occasion, some time ago, to collect municipl statistics upon various topics. Among other questions, the price charged by street railways for fares was taken up. The rates charged in 136 cities in the United States are included in the following list. By the courtesy of Mr. Poppleton "City Government" is permitted to print the table:

	Fare Charged in Cents.
Albany, N. Y.	5
Auburn, N. Y.	5
Atlanta, Ga	5
Augusta, Ga	5
Belleville, Ill	5
Bayonne, N. J.	5
Bangor, Me	5
Brockton, Mass	5
Binghamton ,N. Y.	5
Buffalo, N. Y.	5
Baltimore, Md.	5
Boston	5
Chicago	5
Cincinnati	5
Cleveland (22 tickets for $1.)	5
Columbus, O. (6 tickets for 25 cents.)	5
Cambridge, Mass.	5
Camden, N. J.	5
Covington, Ky	5
Chelsea, Mass.	5
Canton, O. (6 tickets for 25 cents.)	5
Chester, Pa.	5
Cedar Rapids, Ia	5
Columbus, Ga.	5
Concord, N. H.	5
Charleston, S. C.	5
Detroit, Mich. (6 tickets for 25 cents, and 8 tickets, good for a limited period, both morning and evening, for 25 cents.)	5
Denver, Col.	5
Dayton, O.	5
Des Moines, Ia.	5
Duluth, Minn.	5
Dubuque, Ia.	5
Davenport, Ia.	5
Decatur, Ill. (30 tickets for $1.)	5
Danbury, Conn.	5
Evansville, Ind.	5
Erie, Pa.	5
Elgin, Ill.	5
Eau Claire, Wis.	5
Fall River, Mass.	5
Fitchburg, Mass.	5
Findlay, O.	5
Fort Worth, Tex.	5
Grand Rapids, Mich.	5
Galveston, Tex.	5
Galesburg, Ill.	5
Hartford, Conn.	5
Holyoke, Mass.	5
Houston, Tex.	5
Hamilton, O.	5
Indianapolis, Ind.	5
Joliet, Ill.	5
Jackson, Mich. (6 tickets for 25 cents.)	5
Jamestown, N. Y.	5
Kansas City, Mo.	5
Kansas City, Kan.	5
Louisville, Ky.	5
Lowell, Mass.	5
Lynn, Mass.	5
Los Angeles, Cal.	5
Lawrence, Mass.	5
Lancaster, Pa.	5
Lexington, Ky.	5
Leavenworth, Kan.	5
Lynchburg, Va. (School children and suburban residents purchasing tickets in large quantities, 3½ cents.)	5
Lafayette, Ind.	5
Lockport, N. Y.	5
Lima, O.	5
Milwaukee, Minn.	5
Minneapolis, Minn.	5
Memphis, Tenn.	5
Malden, Mass.	5
Muskegon, Mich.	5
Meriden, Conn.	5
New York	5
Newark, N. J.	5
New Haven, Conn.	5
Nashville, Tenn.	5
Norfolk, Va.	5
Newport, Ky.	5
Newburg, N. Y.	5
New Albany, Ind	5
Newport, R. I.	5
North Adams, Mass.	5
Omaha, Neb.	5
Oskosh, Wis.	5
Orange, N. J.	5
Philadelphia (Exchange ticket 8 cents.)	5

Pittsburg 5
Providence, R. I. 5
Paterson, N. J. 5
Portland, Ore. 5
Peoria, Ill. 5
(12 tickets for 50 cents.)
Portland, Me. 5
Petersburg, Va. 5
Poughkeepsie, N. Y. 5
Pittsfield, Mass. 5
Quincy, Ill 5
(11 tickets for 50 cents.)
Rochester, N. Y. 5
Richmond, Va. 5
(6 tickets for 25 cents.)
Reading, Pa. .....3 and 5
Rockford, Ill. 5
Richmond, Ind. 5
Roanoke, Va. 5
St. Louis 5
San Francisco 5
St. Paul, Minn. 5
Syracuse, N Y. 5
St. Joseph, Mo. 5
Salt Lake City 5
(Commutation rates, 4 cents.)
Springfield, Mass. 5
Seattle, Wash. 5
Somerville, Mass. 5
Sioux City, Ia. 5
San Antonio, Tex. 5
Salem, Mass. 5
Sacramento, Cal. 5
Springfield, Ill. 5
Springfield, Mo. 5
Spokane, Wash. 5
Schenectady, N. Y. 5
Sandusky, O. 5
Sheboygan, Wis. 5
Stamford, Conn. 5
Toledo, O. 5
(6 tickets for 25 cents. For one hour, both morning and evening, fare is only 3 cents.)
Tacoma, Wash. 5
Terre Haute, Ind. 5
Troy, N. Y. 5
Utica, N. Y. 5
Washington, D. C. 5
(6 tickets for 25 cents.)
Wilmington, Del. 5
Wilkesbarre, Pa. 5
Williamsport, Pa. 5
Waltham, Mass. 5
Winona, Minn. 5
Youngstown, O. 5
(22 tickets for $1.)
Yonkers, N. Y. 5

GARBAGE PRACTICE.

Health Officer Woodward, of Washington, D. C., has presented each householder within city limits with a card bearing the regulations pertaining to the collection of garbage.

The card is 9½ by 5½ inches in size, of heavy manilla card board, with a small perforation in the centre of the upper end, so that it can be readily hung on a nail.

At the top are printed in heavy, black-faced type:

"Hang This Up in Your Kitchen."

Underneath this line is:

"District of Columbia Health Department."

"Sir: In order to secure and maintain a satisfactory garbage service, it is necessary that you comply strictly with the regulations printed below. Failure to do so will result in the enforcement against you of the penalty provided in Section 10. You will assist further in improving the collection of garbage by reporting promptly to this office any failure on the part of the Contractor to render proper service. Respectfully,

"WM. C. WOODWARD, M. D.,
"Health Officer."

Then follow the regulations, which are clear, comprehensive and explicit.

Worcester's Sewer System.*

By Harrison P. Eddy, Superintendent of Sewers.

During the fiscal year of 1899, the sewer department of Worcester, Mass., accomplished the largest amount of work since its organization. About 250 men were employed on tunnel work for a large part of the year and a total number of 550 men have been on the rolls during the year. Much of the construction has been difficult and most of the trenches have been heavy.

Out of an appropriation of $604,191.30, there have been expended $538,013.32.

All the work was done by day labor—none by contract.

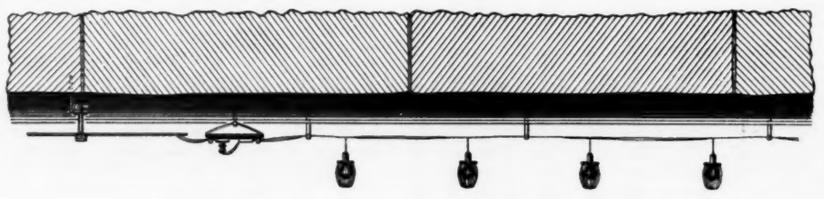
Over twelve miles of sewers were built.

One of the first steps taken towards organizing for the increased amount of work made necessary by the construction of the separating system, was the establishment of the division of tests. For this work a well appointed chemical and testing laboratory was provided. The largest single undertaking was that of testing cement. In the last year and a half 12,000 briquettes have been made, and as many of them as have become due have been broken. These briquettes have been made up neat and with various amounts of standard and common sand.

Aside from special lines of investigation, the samples are tested for periods of time ranging from 24 hours to three years. Hot water tests are applied to each sample, as soon as it comes to the labratory, to furnish quickly any indication of poor quality. The 24-hour neat test is, however, the one upon which the order is issued to unload or reject a car. The cantract does not recognize this test, everything depending upon the seven-day test.

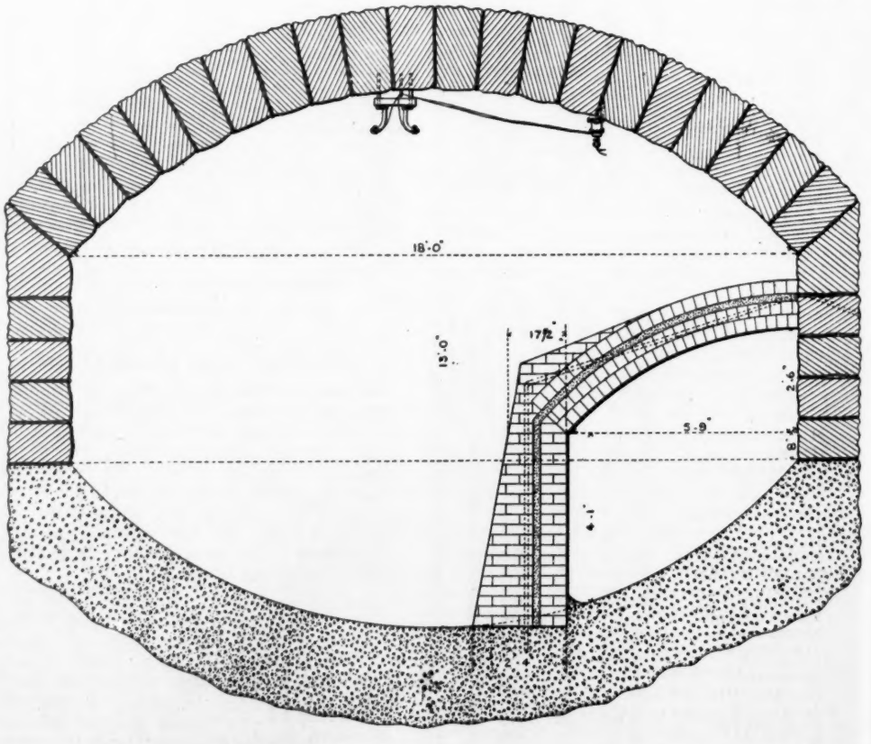
In addition to the mechanical tests, complete chemical analyses are especially valuable in finding the underburned or diluted cements.

Besides the examination of cements, the inspection of bricks, pipe and coal is also included in the work of this division. The testing of oil will be included in the tests of the coming year.



LIGHT STRINGS.

543



INTERIOR OF MILLBROOK.

CUT B.—SKETCH OF MILLBROOK SEWER SHOWING INTERCEPTING CONDUIT AT RIGHT. METHOD OF LIGHTING SHOWN ABOVE.

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CUT F.—SECTION OF FINISHED CONDUIT SHOWING ENTRANCE OF HOUSE CONNECTION, TROLLEY-WIRES AND LIGHT-STRINGS.

An unusually large amount of work has been done in the department of sewer construction, consisting of the building of 6.9 miles of sewer.

The adoption of the separate system of sewers made necessary, in future construction, the building of two sewers in every street, one for sewage and the other for surface water. With the combined system one large pipe received both sewage and natural drainage. To meet the needs of the new system, the experiment has been tried of laying both pipes in the same trench, one enough higher than the other to admit the laying of house conections under it.

By this method the two pipes are laid at a slightly greater cost for excavating than one pipe would be. The trench being sufficiently wide is carried along with one set of sheathing and bracing, when a second set would be necessary if two trenches were dug. One underdrain suffices for both sewers, and the street is torn up but once and only in one place. The only doubtful factor in this method is the power of the upper pipe to stand the unequal pressure due to settlement of the loose material over the lower pipe. The trench is dug at full width until it is nearly deep enough for the upper pipe. Then a narrow trench is dug on one side of the main trench to the grade of the lower pipe. This pipe is laid as usual, and the back filling very carefully tamped up to six inches or a foot above the upper pipe. From this point up the trench is filled and tamped or puddled in the ordinary manner.

CONDUIT INSIDE MILLBROOK.
Length, 3,660 feet.
Size (see Cut B).
Estimated cost, $45,450.00
Cost, $43,875.80.
Work begun, July, 1897.
Work finished April 1898.

The trunk sewer in Millbury street, between Cambridge street and the Blackstone river, a distance of about 4,000 feet, is built of stone, and is 18 feet wide and 13 feet high. The arch has a four-foot rise and springs from the top of vertical walls five feet high.

The invert is also circular and of the same dimensions as the arch. This sewer was designed to take sewage and surface water from a very large portion of the city. It was laid through ledge and occupied so large a portion of the street that it was deemed impracticable to parallel it with interceptors.

Accordingly a conduit was designed to accommodate the flow of sewage inside the larger sewer, a sufficient area in the southern and western sections of the city being resewered to discharge surface water directly into adjacent water courses to make room in Millbrook for the new construction.

This conduit has a capacity of about fifty million gallons per twenty-four hours, and extends from the outfall sewer nearly to Cambridge street, a distance of about 3,660 feet.

For obvious reasons it was not practicable to remove the arch of the sewer and build the new work in open cut as in ordinary sewer construction, therefore it became necessary to provide artificial light, a way for transporting the stock, as well as means for protecting the work from the water.

Having determined upon the use of electricity for lighting and power purposes, it became necessary to establish a power station.

A one-story wooden building of about 1,300 square feet floor space was erected a few feet back from the line of Millbury street. Steam was furnished by a 30-H. P. vertical fire-tube boiler for a double, vertical 9x9-inch engine, this engine forming a part of the duplicate sludge-pumping machinery to be installed in connection with the sludge presses at the purification works. This engine was connected by a countershafting to a 12½ kilowatt, four-pole, compound wound, open-type, 220-volt generator. In the centre of the engine-room a skeleton switch-board was erected and equipped with the necessary switches, ampere and voltage meters and a circuit-breaker.

A small, single-drum hoisting engine was placed in the engine-room, and was used for pulling the stock cars up the incline described later. A small office was located in one corner of the building, and a room for the storage of cement occupied another corner.

The machinery and stock deliveries to the sewer were so arranged that one engineer was able to attend to everything, including accounts of stock used, except at times of extreme draught on power lines, when he was assisted by a fireman.

The land upon which the power-station was located sloped rapidly from the rear of the lot to the street line, where it was about 8 feet below the level of the sidewalk on Millbury street. A short tunnel was driven under the street to the sewer. This was timbered in the usual way, and was on a grade sufficient to allow stock-cars to descend by gravity.

The air in the sewer was very warm and impure, and proved to be rather debilitating. It was necessary, therefore, to guard against increasing impurities and temperature. For that reason the use of steam or troches was avoided and electric light and power were used.

The work was lighted by 16-C. P. lamps attached, one in every three feet, to eight strings. These strings were 30 feet long, and consisted of two No. 14 in-

sulated wires fastened at one end to a board, 4x16 inches, which was provided with a fuse-box and switch. Tail wires extended from this switch-board to the copper mains, to which thew were attached by mechanical clamps. These light strings were hung on hooks driven into the arch over the work and were easily moved ahead as the work was completed.

The water in Millbrook was about three feet deep on the average, although much of the time it was four feet deep.

A coffer-dam was erected around the work, which kept the water out almost completely. It was built in sections six feet high and 16 feet long, of 2-inch tongued and grooved spruce plank. These sections were suitably cleated with 6-inch strips of the plank, and on each end was fastened a strip of 2½x½-inch iron, which had bolt holes drilled in it. On the bottom of each section a 2x6-inch sill was fastened, and the under side of this had a wad of oakum attached and was protected by a covering of burlap.

For pumping the large amount of water which had to be removed from the coffer-dam when first erected and after overflow caused by storms, a 4-inch centrifugal pump was provided. It was placed in a scow and belted direct to a 10-H. P. mining motor of enclosed type.

The power was obtained from the copper mains by temporary connection of flexible cables. With this apparatus the water was quickly pumped, and the whole was easily moved ahead as progress required.

After all preliminary work had been done, the construction of a conduit was a comparatively simple operation. The invert was cut out just enough to form a level footing for the side wall, then anchor-irons were placed in position and fastened, and the side wall and arch were built. Eight inches from the inside face of the wall a 2-inch core of cement mortar was laid, and this was carried through the arch without break. This was to insure as nearly water-tight work as possible. The outside of the conduit was plastered with cement mortar and left smooth. Connections through the original sewer on this side were taken into the conduit through its arch as seen in Cut F, as they almost invariably entered above it.

The side of the wall was 2 feet 4 inches thick at the bottom and 1 foot 6 inches at the top. It was 4 feet 3 inches high. The arch was about 14 inches thick, including core, as shown in sketch Cut B.

On this work about 1,300,000 hard-burned, water-struck brick and about 10,000 barrels of Atlas American Portland cement were used.

Manholes were set in the arch at frequent intervals to facilitate cleaning and inspection.

Under the best of conditions a progress of thirty-two feet per day was made, but the delays were frequent and at times of considerable length, so that about seven months' time was occupied in the construction of this conduit.

TROUBLE WITH THE GARBAGE COMPANY.

The people of East Liverpool (O.) are having trouble over the disposal of their garbage. The weak point seems to be that the company having the contract lacks proper facilities for the collection of the garbage.

The following are the rates fixed by council to be paid by the residents for the removal of their garbage twice each week during the summer months, commencing April 1, and once a week during the winter months, commencing October 1:

Private residences, six rooms or less.	$ .08
Private residences, over six rooms..	.10
Boarding houses, eight rooms or less.	.10
Boarding houses, over eight rooms..	.15
Restaurants, meat markets and groceries	.20
Hotels	.50

Municipal Trading in England.

(Condensed for "City Government.")

In England, what is called municipal ownership in the United States is known as municipal trading. There, as here, it is looked upon as having two sides. Lord Avebury takes the negative side of the question. In an article in the July "Contemporary Review," of London, he said:

"The following are among the businesses which it is now suggested that municipalities should undertake: Banking, pawn-broking, coal supply, telephones, tailoring, manufacturing of electrical fitting of the residual products of gas, supply of apparatus for games, Turkish baths, cold air stores, refrigerators, estate agency, printing, constructing lifts, saddlery, milk, bread, etc. Such proposals seem open to many objections. Amongst others are:

"1. The enormous increase of debt which such a policy will involve; 2. The check to industrial progress; 3. The demand on the time of municipal councillors, which will (a) preclude the devotion of sufficient consideration to real municipal problems, (b) prevent men who have any business or profession of their own from entering municipal life; 4. The undesirability of involving governments and municipalities more than can be helped in labor questions; 5. The fact that the interference with natural laws in some important cases has the effect of defeating the very object aimed at; 6. The risk, not to say certainty, of loss.

"The indebtedness of our local bodies now exceeds £250,000,000, and will in any case increase, but if the present tendency to embark in industrial enterprises is not checked, it will, as the rapid increase in the figures shows, ere long reach many hundred millions sterling. If the English water companies are all taken over, that will mean another £100,000,000. The gas companies would add another £50,000,000; dwellings for the poor, £50,000,000; tramways, £30,000,000. In the United States already £50,000,000 has been spent on electrical power. Then tnere are electric lighting, telephones, etc., etc. Add on the capital required for manufacturing, and it is evident how enormous our local indebtedness will become if some check is not put to the present tendency.

"I firmly believe that municipalities will lose money. We have some object-lessons before us. The telegraphs are often referred to as being a brilliant financial success. But what are the facts? We have lost altogether over £7,000,000, and the yearly deficit is increasing. Three years ago it was £340,000; two years ago, £440,000; last year no less than £600,000! In Victoria the railways have been for some time worked by the state, and the result has been a loss of no less than £7,750,000. Nor is this the only case. South Australia has also lost £2,000,000. Unless the present tendency is checked, we must be prepared for a great increase in our rates, and in the number of our municipal employees, for an enormous expansion of our local debt, for a serious check to private enterprise, and a discouragement to the progress of invention and discovery."

LAKE SHORE AND MICHIGAN SOUTHERN RAILWAY.

The scenery along the southern shore of Lake Erie is full of beauty and a joy for ever. The Lake Shore road is the only one which affords an opportunity for the traveler to drink in its charms without stint or hindrance. Don't forget, therefore, when travelling between Buffalo and Chicago to take the Lake Shore.

If you have, at the same time, a desire to "get there"—not at any old time, but on time—take the Lake Shore. Its "Fast Mail Limited" holds the world's record for fast time. This is no "newspaper yarn;" this is a fact, backed up by Uncle Sam, who awarded the contract for carrying his mail to the railroad having the most reliable and quickest service between Buffalo and Chicago. And the Lake Shore has the contract. See!

It's all well enough to have beautiful scenery and to make quick time, but if you are uncomfortable it stands for naught. For downright solid comfort the Lake Shore is seldom equalled and never excelled. With a road-bed built and maintained on scientific principles, and every conceivable wish of the traveler anticipated and provided in both the day coach and parlor car service, together with the courteous attention and consideration of the train officials, travelling becomes a pleasure without alloy. Therefore, take the Lake Shore.

Address A. J. Smith, General Passenger and Ticket Agent, Cleveland, Ohio, and he will send all desired information.

HUDSON RIVER BY DAYLIGHT.

It is worth a trip across the continent to enjoy the ride down the Hudson from Albany to New York by the Albany Day Line. The boats of this line have been constructed with a view to day service only. They are provided with every modern convenience to promote the patrons, comfort and enjoyment. Elegantly furnished throughout, including some of the finest paintings and statuary, they are kept immaculately clean. The dining saloon is so constructed that one can dine and enjoy the scenery at one and the same time.

The ride is 150 miles long, with an ever changing view, the beauty of which surpasses description. The charming low land scenery, mountainous and picturesque are all included, to say nothing of the magnificent Hudson itself. These beauties taken together with historic and other points of especial interest go to make up a perfect day. Those who have traveled far and wide declare this bit of American scenery as seldom equalled and never excelled.

From the hurricane deck of the steamers "New York" and "Albany" can be seen, on approaching the great Metropolis, one of the most interesting panoramas in the world—the river-life of Manhattan, the high buildings of Broadway, the great Transatlantic Docks, The Recreation Piers and an ever-changing kaleidoscope of interest. The view is especially grand between the hours of five and six in the afternoon, as the western sun brings the city in strong relief against the sky.

If tourists wish to enjoy this beautiful view, they should stay on the hurricane deck until the boat is well into her Desbrosses Street slip.

For information address F. B. Hibbard, General Passenger Agent, Desbrosses Street Pier, New York.

PUBLIC SAFETY.

Fire.

IDEAS OF SOME LEADING CHIEFS.

BENEFITS OF A SALVAGE CORPS—RELATIVE VALUE OF STEAM AND CHEMICAL ENGINE—USE OF RUBBER TIRES AND ROLLER BEARINGS.

The discussion concerning the salvage corps and other important fire matters continues. Seven other leading chiefs contribute their opinions and experience.

CHIEF STOGG, PATERSON, N. J.

"First—We have no salvage corps in connection with our department, therefore I can give no opinion as to benefit of same.

"Second—No modern department should be without plenty of small extinguishers, and chemical engines for incipient fires. On heavy work only steam fire engines or good pressure from mains should be used.

"Third—We have no rubber tires nor roller bearings on apparatus.

"Fourth—One fire company of eight to 10 men to every 10,000 inhabitants in cities of from 75,000 up."

* * *

CHIEF KELLOGG, SIOUX CITY, IA.

"First—We have no salvage corps in our city, but I believe that all cities of 100,000 and over should have them.

"Second—In reference to the relation of the steam fire and chemical engine. I will say that, in my opinion, each one has a separate and distinct place in a modern fire department. For small fires and inside fires the chemical is invaluable, but in fires of any magnitude the steam engine is the one you have to depend upon.

"Third—We do not, as yet, use rubber tires or roller bearings on our apparatus, but I believe that they are a great improvement and hope to be able to adopt them in the near future.

"Fourth—How many companies are needed to protect a city of 10 square miles is a very hard question to answer. That depends on a great many things. It would depend upon how thickly the city was built up, the population, and so forth. It would depend upon whether it was hilly or level. It would depend upon the character of the buildings whether they were made principally of wood or of stone, brick and iron; their size; whether there were many factories or not; whether they used steamers, or had direct pressure from pumps, or reservoir, and many other things that could be mentioned if time and space allowed. So you see that no one could give any reasonable answer to this question. It might need 10 or 15 companies and it might need 25."

* * *

CHIEF PULLER, RICHMOND, VA.

"We have no salvage corps in this department. I believe all cities of 40,000 inhabitants and over, should have from one to as many as the size of the city might require. I can recall numbers of fires where thousands of dollars could have been saved by a salvage corps; and it is surprising to me that where cities will not maintain them, the insurance companies do not, at their own expense, as it would be a most profitable investment.

"As to your second question much could be said but suffice it to say, nothing, in my opinion, is as reliable as the steam fire engine, which is the main line of battle; the chemical being the skirmish line, and it often conquers the enemy without the aid of the engine.

"We do not use rubber tires or ball bearings. The former I do not think much of, on fire apparatus, unless the streets are smooth; the latter, are of great benefit to heavy machines.

"Your fourth question would depend largely upon the style of buildings and the kind of business done. A manufacturing town would require a larger department than a commercial. Here in Richmond, we have an area of about seven square miles, with eight steamers, three combination chemical wagons and three trucks, which I think sufficient for our present needs."

* * *

CHIEF MAGUIRE, SAVANNAH, GA.

"Up to last January we had in service a salvage corps in connection with this department, but, owing to the additional expense necessary to operate it, we were compelled to abandon the corps so as not to deprive the fire department of much needed improvement. I believe that a salvage corps should be maintained by the insurance companies, inasmuch as they are the greatest gainers by its introduction. Men employed in the salvage corps can not possibly perform any other service at fires.

"Replying to your inquiry as to relative value of steam fire engines and chemical engines I beg to say that, in my opinion these two pieces of apparatus occupy entirely different positions in the fire department. The chemical engine is highly valuable as an extinguisher of fire in its incipiency and is noted, especially for the great salvage as copmared with the use of water. The steam fire engine is intended in most places to give pressure at the nozzle which can not be obtained directly from the water works; in other places they are intended and used for supplying great volumes of water. I think that there is no well organized and equipped fire department without both steam and chemical fire engines.

"I do not use rubber tires or roller bearings on fire apparatus. I have rubber tires on my service buggy and would not be without them.

"I think a city with an area of 10 square miles could be very satisfactorily protected by nine companies; four of these companies to include hook and ladder trucks; all hose tenders to be of the combination pattern, carrying single tank of chemical; the engine companies to consist of 10 men, those having hook and ladder trucks to consist of 18 men."

* * *

CHIEF McMAHON, ERIE, PA.

"First—This department has no salvage corps.

"Second—The steam fire engine is, without question, an indispensable apparatus and needs no farther comment; as to the merits of the chemical engine, will say, that I would not consider a fire department of any size efficiently equipped without its use, as the statistics of this and other cities plainly demonstrate its value,—fully 75 per cent. of the fires being controlled by its use.

"Third—The rubber tires we use on light apparatus only, and these have been in use for three years with entire satisfaction.

"Fourth—In regard to the number of companies needed to protect a city of 10 square miles, a great deal would depend upon the nature of the construction of cities. For instance, a city may have a rigid fire ordinance and the percentage of wooden buildings be greatly reduced; again, cities having large manufacturing interests demanding fire protection; or, a city may have an area of 10 square miles and a small population comparatively. But, judging from my experience, I would say, that a city of this area, presuming it to have a population of 75,000, would need 12 engine companies; two aerial trucks; one 65-foot ladder, and one 80-foot ladder; also one city truck and three chemical engines. All should be properly distributed and manned with the usual 10 to 12 men to a company. However, the demand of a department greatly depends upon the construction of a city."

* * *

CHIEF DEVINE, SALT LAKE CITY.

"We have no salvage corps in this city. The benefits are incalculable, and I am convinced it should be part of every fire department in cities of 25,000 or upwards. Not a year has passed but enough could have been saved by such an auxiliary to more than pay for its maintenance.

"Answering your next question: I cannot say where comparison can be properly made between 'the relative value of the steam fire engine and the chemical engine. Both have their positive and distinct functions, in which there is no affinity excepting for the extinguishment of fire. The steam fire engine is a positive necessity in all cities where the pressure system is not in force, and, consequently, is indispensible. The chief value and purpose of the chemical fire engine is its use in incipient fires, and chiefly those that are confined within buildings. The chemical fire engine of to-day is a most valuable adjunct to the fire service, and to many of us it would seem almost indispensible. Its two chief merits are: First, the promptness with which it can be used; second, its use eliminates the water loss always incident to the regular water stream.

"We use rubber tires (solid) on chief's buggy with satisfaction. We have three pieces of apparatus equipped with roller bearings, and, so far, they have proved satisfactory.

"Your next question cannot be answered intelligently without a knowledge of the city containing 10 square miles. Its commercial character, kind of buildings, geographical situation, number of inhabitants, etc., must determine largely its needs in fire protection. I think it is a generally recognized rule that a city should have about one paid fireman to every one thousand of population. It follows, of course, that the greater the

commercial interests are for the population of the city, the greater necessity exists for increased fire protection."

* * *

CHIEF KELLOGG, SEATTLE, WASH.

"We have no salvage corps connected with this department. Judging from the experience of the past the benefits of such a corps would not justify the expense of its maintenance. While it may be that a loss may occur at any time that would have been avoided were such a corps established, there have been no fires for a number of years where the water loss would have justified, even for one month, the maintenance of a salvage corps. In larger cities with more extensive stocks, their value must have been established or a salvage corps would not be supported by the insurance companies.

"As to the relative value of the steam and chemical engines: No fire department is properly equipped without them both. Each in its place is indispensible, while with the steam engine alone, fires would be extinguished, it would be at an enormous water loss, which the smaller stream and superior extinguishing properties of the chemical obviate. In the smaller cities and fire departments, the company membership is reduced to the minimum. Chemical lines require fewer men, are more quickly handled and will be at work and often have the fire extinguished before the main lines are ready to deliver water, thereby saving the water loss. The advantage of the chemical engine cannot be overestimated. It will be understood that dependence is always had on the shut-off and spray streams that are attached to all up-to-date play pipes, but even these and with the greatest care a water loss always follows the use of large streams of water. The use of a chemical largely does away with the necessity for a salvage corps. The chemicals in use in our department save, annually, more than their cost and maintenance. We have three chemical companies in commission, double 50, 60 and 80 gallons each, and 40 per cent. of our fires are extinguished with chemicals alone. We have six engine companies: three, first class; two, second class, and one, third class. We also have a fire-boat with a capacity of 8,000 gallons per minute, throwing fourteen streams, (the largest a 3-inch stream). This service is available at a distance of 800 feet from the water front. We have three truck companies (two in service); eight hose wagons and one reel, each carrying 1,150 feet of two and one-half inch hose; also, sixteen portable extinguishers, one extension truck with a water tower attachment. The above enumertaion embraces the apparatus in use in this department.

"The question of protection for a city of 10 square miles is a difficult one to answer. The conditions satisfactory for one would be inadequate for another, so much depends upon the width of streets and the condition and grades; the size and quality of buildings; combustible stocks carried and the size of water mains and water pressure. A city of that size may contain 10,000 or 150,000 population and, as stated above, the necessities of the smaller would be inadequate for the larger.

"We do not use rubber tires but have roller bearings on our first class engines, which are handled by three horses each, abreast, and we find the roller bearing most satisfactory."

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MORRIS W. MEAD, SUPERINTENDENT BUREAU OF ELECTRICITY, PITTSBURG, PA.

MEETING OF MUNICIPAL ELECTRICIANS.

The fifth annual meeting of the International Association of Municipal Electricians will be held at Pittsburg, Pa., Sept. 25-27, 1900.

The officers of the Association are as follows: William Brophy, President, Chief Electrician Wire Department, Boston, Mass; G. F. MacDonald, Vice-President, Supt. Fire Telegraph, Ottawa, Can.; Adam Bosch, Treasurer, Supt. Fire Telegraph, Newark, N. J.; George H. F. Cottell, Secretary, City Electrician, Boston, Mass.; Burt C. McAllister, Financial Secretary, Chief Engineer and Supt. Fire Telegraph, Bradford, Pa.

The members of the Executive Committee are as follows: Morris W. Mead, Chairman, Supt. Bureau of Electricity, Pittsburg, Pa.; W. Y. Ellett, Asst. Chief Engineer and Supt. Fire Telegraph, Elmira, N. Y.; J. W. Aydon, Supt. Fire Telegraph, Wilmington, Del.; F. G. Boyd, Supt. Fire Telegraph, Baltimore, Md.; F. C. Mason, Police Telegraph, New York (Borough of Brooklyn).

At this session papers upon the following subjects will be read and discussed:

No. 1. "Benefits to be Derived from Our Association," by Capt. William Brophy, Chief Electrician Wire Department, Boston, Mass.

No. 2. "Contact Points," by Frank C. Mason, Supt. of Police Telegraph, Brooklyn, N. Y.

No. 3. "Trials and Troubles of Instituting and Enforcing Municipal Inspection and Control," by M. G. Canfield, Supt. Fire Alarm Telegraph, Grand Rapids, Mich.

No. 4. "Automatic Fire Alarm Systems," by Charles Burger, Manager the Boston Thermostatic and Automatic Fire Alarm Co., Boston, Mass.

No. 5. "Advantages and Disadvantages of Carrying High and Low Potential Conductors Upon the Same Poles." This subject will be presented by an able electrician for general discussion.

The headquarters will be at the Monongahela House, where all sessions of of the Association will be held in the banquet hall. This hotel has been headquarters for conventions for the past fifty years.

All delegates and visitors will be accommodated there at $3 and $4 per day, American plan; those who desire European plan can be accommodated at the Griswold Hotel for $1 per day and upwards; at Newell's Hotel, Henry Hotel, Lincoln Hotel, Duquesne Hotel, Schenley Hotel for $2 per day and upwards; also at the Seventh Avenue Hotel and Anderson Hotel, American plan, $3 per day and upwards.

There will be two sessions daily, at 9.30 a. m. and 2.30 p. m., respectively.

During the evening of the twenty-fifth, there will be a trolley ride on special cars over the Consolidated Traction, United Traction and the Monongahela Street Ralway Companies' lines, which cover many miles of the most beautiful and picturesque scenery in this country.

During the afternoon of the twenty-sixth, there will be carriage rides over the boulevards and through the parks for the ladies, and in the evening theatre parties and inspection of some of the large iron and steel mills by those who desire to see them.

The afternoon and evening of the twenty-seventh there will be an excursion on the steamer Mayflower down the Ohio river to Davis Island Dam, seven miles and return, then up the Monongahela river forty miles and return, during which there will be a banquet served and during the entire trip the guests will be entertained by the Tariff Club Quintet, C. F. Harris, manager, and a musical program arranged and directed by Professor H. P. Ecker, city organist of Allegheny, Pa. On this trip all will have a good view of many of the largest manufacturing plants of the world-famous city of Pittsburg.

Fire Department Items.

Philadelphia and Buffalo have recently added a modernly equipped fireboat to their departments.

* * *

Herman F. Newman, formerly of Cincinnati, is in Indianapolis, endeavoring to establish a salvage corps.

* * *

Chief Barrett (Ind.) continues to hammer away about the much needed improvements in his department.

* * *

The fire laddies of Virginia will meet in annual convention September 26 to 28, 1900, at their capital city, Richmond.

* * *

Chief Mayo is now at the head of the Toledo (O.) department, to fill the vacancy made by the resignation of Chief Wall.

* * *

The Council of Sioux Falls (S. D.) has passed an ordinance changing the department from a volunteer to a paid service.

* * *

Scranton (Pa.) has recently added a life saving corps to its department. It is made up of members of the William Connell Hose Company.

* * *

It is said that the late C. P. Huntington, in the early days of Sacramento, Cal., was a most active member of Company No. 3 of the volunteer fire department in that city.

* * *

The Indianapolis Council has killed the ordinance authorizing an expenditure of $150,000 for improving the fire department. As a consequence the insurance rates will be raised.

* * *

Through the efforts of Mayor W. J. Diehl, of Pittsburg, the firemen's relief fund, to be applied to the families of the men killed in recent fires, has passed the $6,000 mark—$10,000 are wanted.

* * *

Fire Marshal Gladwin of New Haven (Conn.) is a most thorough official. He keeps a careful eye on the cellars of drug, crockery, grocery stores, and all other places where rubbish is permitted to accummulate.

* * *

Recently the Luverne (Minn.) fire department was called on to help the little village of Windom—63 miles distant—put out its fire. In just 90 minutes after the call was received the Luverne fire laddies were at work.

* * *

The fire engine trust is the last to enter the field. It is reported that a consolidation of the largest manufacturers of heavy fire apparatus in this country has been effected under the name of the International Fire Engine Company.

* * *

Chief Mullin of Birmingham, Ala., was up against a tough proposition recently, in the shape of charges of malfeasance, but he came off with flying colors. The trial lasted several days and was most thorough. The vote for acquittal was 12 to 1.

* * *

Battalion Chief Charles W. Lane, of the New York department, was recently killed by a trolley car. A buggy in which he was driving was hit by a Brooklyn Rapid Transit car. The chief and his companion, a young woman friend, were thrown out. The young woman escaped with a few bruises, but Chief Lane received injuries which caused his death in a short time.

They are now talking of electric fire engines in New York. The plan is to have a cable, which would be attached to the nearest trolley line—overhead or underground—and instantly a power equal to that of many engines would be available.

* * *

A beautiful monument erected to the memory of the late Philip Eckel, former chief of the Syracuse (N. Y.) fire department, was unveiled and formally presented to the city on August 22, 1900. The expense of the monument was raised by popular subscription.

* * *

The types made Chief Marjenhoff of Charleston, S. C., say in the August issue of "City Government": "the three six-gallon fire extinguishers." Instead it should have read: "three and six-gallon fire extinguishers," of which there is an adequate equipment.

* * *

A driver in a New England city obtains good results by reversing the position of his horses every second run. In this way the animals are trained to work in either position, and it is found to be convenient when using extra horses.

* * *

A late invention for the use of firemen is a fan, which is operated from a line of hose, designed to draw the smoke from a burning building, so that the firemen can enter. It has lately been tested at St. Paul, Minn., and pronounced a success.

* * *

Chief Croker, of the New York department, has recently retired many of the veterans of the service or sent them to the districts where the work is easy and the calls few. When asked why, the chief replied:

"I'm going to give the younger blood a chance."

* * *

The Delaware, (O.), fire department recently made a test run from the department house to the court house, a distance of 1,141 feet. It was made for the purpose of beating the record of the state, and from the instant the fire bell tapped till a stream of water was thrown at the end of the journey, the official time was exactly fifty-seven seconds flat.

* * *

"The Fireman" is the name of an 18-page paper, published by one of the companies of the Savannah (Ga.) department. "The Fireman' is published," it says, "Whenever we get ready to publish it. We may have an issue next week and we may not appear again for 30 days. We can afford to be independent as we charge nothing for our paper. All we ask is that you furnish the stamps necessary to send it to you by mail."

The sheet is a credit to "the boys," and shows much enterprise for that Southern clime—indeed for the Northern, too.

IMPORTANCE OF "ADS."

A certain amount of custom will come to any business establishment with no other invitation than an open door. But until the manufacturer advertises, the advantages which he has to offer to the public he cannot expect any considerable increase in his business.

The citizens of Joliet, Ill., are much exercised over the use of open garbage wagons. The odor of the garbage while in transit to the crematory, is offensive, they say. :Why not use closed sanitary wagons? There are such made. It would remedy the evil.

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THE CHARLESTON CONVENTION.

Keep your mind on Charleston. This meeting of the Chiefs will be the greatest in the history of the association.

Chief Marjenhoff is rapidly maturing his plans for the entertainment of his guests. From present indications the southern reputation for hospitality will be more than sustained. And there will be a crowd to enjoy it, for every one wants to go to Charleston.

The railroads have offered the special rate of a fare and a third on the certificate plan.

The next number of "City Government" will be a convention number.

MICHIGAN FIRE DEPARTMENTS.

A canvass of the fire departments of the cities and villages of Michigan has been completed by Labor Commissioner Cox, of Lansing. Among other things it shows that only 24 of the 78 incorporated cities of Michigan have paid departments and employ full time men. There are 794 men so employed, and their aggregate annual salary is $637,066, an average of $802.33 each. Twenty-nine of these cities allow full time men time off, 23.4 days being the average time allowed per year. Sixty-five of the cities employ part time men. There are 1,592 men so employed, an average of 24.5 per city. Some of these men are paid by the year, others by the hour, some by the fire and still others as occasion requires. In sixty-nine cities property of the aggregate value of $2,217,098 was destroyed during the past year, the average per city being $32,132. Sixty-one cities report that the departments saved property of the aggregate value of $12,713,600, an average of $208,420 per city.

There are 305 incorporated villages in Michigan, but only 158 of them have organized fire departments, and in 151 of these there is simply a volunteer service. Only eight villages employ regular firemen, and these are paid an average salary of $32.20 per month. Fire engines are owned by 157 villages, there being 102 hand engines, 37 chemical and 31 steam engines. A total of 227 villages have fire department property of the aggregate value of $335,553, an average of $1,566.32 per village.

FIRE ENGINEER'S CONVENTION.

The next Annual Convention of the International Association of Fire Engineers will be held at Charleston, S. C., October 9 to 12, 1900.

Tickets at low special rates will be sold to delegates going via Atlantic Coast Line, which is the popular through car line with double daily service, via Washington and Richmond, in connection with the Pennsylvania R. R.

Full information can be had on application to the New York office of the Atlantic Coast Line, 229 Broadway.

GYPSINE.

One of the most recent substances to be tested by the British fire prevention committee is a material known by the trade name of "Gypsine." It consists of a mixture of plastic hydraulic lime with coke or sand and asbestos, and then moulded into bricks. The test was made with a partition constructed of bricks of this substance laid in hydraulic mortar, with joints one-quarter of an inch thick. On the side nearest to the fire the partition was coated with a thin layer of fire-clay, and an area of seven feet nine inches by 10 feet was exposed to the flame. The test lasted an hour, and a temperature of 2,050 degrees Fahrenheit was attained, but the partition proved impervious to the flames, and at no point was its out-side surface possessed of sufficient heat to ignite a match.

CHIEF GUTHRIE'S REPORT.

The tenth annual report of the Sacramento (Cal.) fire department has been submitted by Chief Guthrie. The report says that the cost of maintaining the fire department during the past year was $40,831.95, and Chief Guthrie estimates that $40,000 will be required to meet expenses during the ensuing year. The chief asks for $12,000 for the purpose of establishing an engine house in the eastern part of the city.

The losses from fires the past year amounted to $40,819.31, of which $21,353.75 was on buildings and $19,455.56 on personal property. The total amount of insurance involved was $303,845. Insurance paid on buildings, $20,554.75; on personal property, $15,722.21.

The chief urges that the assistant engineer be provided with a horse and buggy and also calls attention to the scarcity of water.

He says the city needs a better fire alarm system.

CHIEF HALE WINS THE WORLD'S CHAMPIONSHIP.

On account of the representations against the ruling whereby the representatives of the Kansas City fire department were disqualified in the international fire department championship competition, on the ground of professionalism, the French exposition officials decided to create a special class for paid firemen, all the other teams being composed of volunteers, for whom the competition was evidently intended, no official fire department of any country being represented. Even the French fire department did not compete. This was not previously made clear, and the representatives of Kansas City not being aware of the fact that the competition was intended only for volunteer fire departments. The Kansas City firemen, in the preliminary exercises, completely out-distanced all others in power of engines and promptitude and rapidity of their work.

They defeated the Italians in the final test with perfect ease, the Americans reaching and extinguishing the fire and rescuing the inmates in three minutes forty-two seconds, the Italians taking 10 minutes 12 seconds to carry out the same program.

Kansas City thus won the world's professional championship cup. The officers received gold medals and silver medals, and the money prize, 600 francs, was divided among the officers and men. The minister of war, General Andre, presented the prizes to Chief Hale, and he was personally commended by the President of France.

NEW YORK STATE VOLUNTEERS.

The twenty-eighth annual convention of the New York State Volunteer Firemen's Association was held in Syracuse from August 21st to the 23d inclusive.

There were more than 600 delegates present and several thousand visitors.

An appropriation of $500 was made with which to make a payment on the mortgage on the Firemen's Home.

The following officers were elected to serve for the ensuing year:

President, Judge Joseph E. Eggleston, Cortland; first vice-president, W. E. Colegrove, of Horseheads; second vice-president, J. P. O'Brien, of Troy; secretary, Thomas Honohan, of Frankfort; treasurer, G. H. Scott, of Coxsackie; trustees of the Firemen's Home at Hudson, Elias P. Mann, of Troy; A. B. Steele, of Herkimer: Frank M. Baker, of Oswego, and Samuel B. Williams, of Rochester.

There was a sharp contest over the selection of the place of meeting for 1901, but Buffalo won out, and the next convention will be held there during the Pan-American Exposition.

MASSACHUSETTS' ANNUAL ASH-HEAP.

Fire Marshall Charles W. Whitcomb has submitted his report of the fire losses in Massachusetts. It contains some interesting statistics. The total number of fires occurring throughout the state (population 2,500,183) during the year was 5,325, of which there were 4,125 in wooden buildings, 1,060 in brick buildings, and 145 other than building fires. The loss on the same was $6,783,084. The sound value of the property damaged by fire was $69,052,377. The amount of insurance at risk on the same was $59,855,355; insurance loss paid on same, $5,596,750.

Of the total number of fires, 279, or 5 2-5 per cent. of the total number, were of incendiary origin. The total sound valuation of the property damaged by incendiary fires was $1,527,341; the total insurance covering the same, $1,505,225; total loss on same, $299,221; insurance loss, $251,136.

Four hundred and thirty-six fires were of unknown origin. The total sound valuation of property damaged by such fires was $4,694,088; total amount of insurance covering same, $3,767,634; total loss on same, $1,805,481; insurance loss, $1,490,436.

The proportion of loss to the value of property damaged has this year, as in years past, been greater in fires occuring outside the city of Boston than in that city, and the proportion of loss to valuation of incendiary fires has also been much greater than in the city.

During the year 4,994 fires occurred in cities and towns where there was fire protection, as against 4,206 in 1898, and 331 occurred where there was no fire protection, as against 307 in 1898.

Statistics of fires with fire protection:

Valuation	$68,076,582
Insurance	59,221,405
Loss	6,172,231
Insurance loss	5,215,965

Statistics of fires without fire protection:

Valuation	$979,795
Insurance	633,950
Loss	610,853
Insurance	380,785

THE BERLIN EXPOSITION.

(Special to "City Government.")

Manufacturers of fire preventing and extinguishing apparatus and "City Government" readers will be interested in the "Berlin Exposition of Fire Prevention and Extinguishment," to be held in that city 1901. Consul-General Mason writes as follows concerning the matter:

"The duration of the Exposition and the competitions pertaining thereto will be from six to eight weeks. The day of opening and closing will be announced in due course. Competition is open and a cordial invitation issued to exhibitors from all countries, who should address their applications for space to Mr. Emil Jacob, managing director, 41 Linden Strasse, Berlin, S. W.; telegraphic address, "Feuerrettung," Berlin. The form of application can be secured from the Bureau of Foreign Commerce, Department of State, Washington, D. C.

Police.

Police Items.

The city of Tampa, (Fla.) has adopted the eight-hour police system.

* * *

Niagara Falls, (N. Y.) will soon have a police patrol signal service at an expense of $6,000.

* * *

THE SHIRT-WAIST POLICEMAN.

The shirt-waist is popular with the city official. Camden's (N. J.,) police force has been permitted to shed the heavy uniform during the heated term. Mayor Harbison of Hartford, (Conn.) advocates a similar privilege for the policemen of his city. And so do the Police Commissioners of Birmingham, (Ala.).

* * *

SUPERSTITIOUS COPS.

Buffalo's police captains number 13. They are handsome and brave, but superstitious. They wanted a group picture of themselves, but the number 13 daunted them. So they cast lots, to see which one should drop out, and the lot fell to Capt. J. H. Taylor. Capt. Taylor appears alone, in citizen's clothes. If a Buffalo police captain were to come upon a body of 13 lawbreakers, he would ask one of them to withdraw before arresting the 12.

* * *

PROPORTIONS OF POLICEMEN.

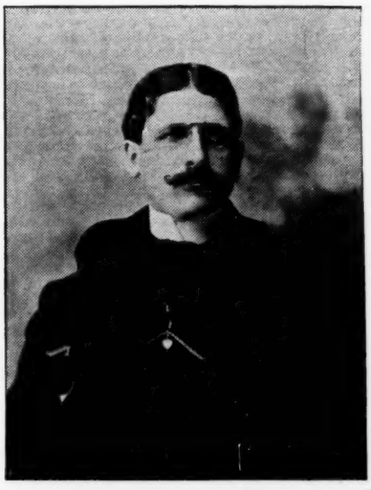
The Civil Service Commission of San Francisco has issued a circular showing the physical standard required from all who may seek places in the Police Department under the rules of the Civil Service. The Commission claims the standard to be the highest in the United States. The smallest man on the force will be one and one-half inches taller and 22 pounds heavier than the smallest man on New York's police force. The measurements required follow:

Height.	Minimum weight.	Maximum weight.	Minimum chest.
5 ft. 9 in. ...	155	185	36 in.
5 ft. 10 in. ...	160	190	36½in.
5 ft. 11 in. ...	165	200	37½in.
6 ft.	170	205	38 in.
6 ft. 1 in. ...	175	210	39 in.
6 ft. 2 in. ...	180	220	40 in.
6 ft. 3 in. ...	185	225	41 in.
6 ft. 4 in. ...	185	230	42 in.

PUBLIC WORKS.

Water.

CENTRAL WATER WORKS ASSOCIATION.



A. J. PRAY, CHAIRMAN ENTERTAINMENT COMMITTEE,

of Central Water Works Association, held at Columbus, O., September 4 to 6.

PUBLIC WATER SUPPLIES FROM DRIVEN WELLS.

OWNERSHIP OF UNDERGROUND WATERS—COST OF WELLS—BIBLIOGRAPHY.

By E. Kuichling, C. E.

OWNERSHIP OF UNDERGROUND WATERS. .

In former times when communities were small, and individuals usually obtained a moderate water supply from wells on their own premises, the old English common law, which is in large measure also the basis of property rights in the United States, established the rule that the water which percolates in undefined channels through sand, gravel, or any other permeable formatoin underlying any land, is practically a part of such land; and hence that all property rights in such water remain with the owner of the land, qualified only by the equal right of all adjoining land owners to the water under their properties. So long as the demand for water was relatively small, and the underground supply was in excess of the consumption, the justice of this law was unchallenged; but with the growth of population and the increasing number of public water works whose only available source of supply is underground water, new conditions have arisen whereby a strict application of the old law often results in an injustice to some community or individual. Furthermore, while the rights to water from surface streams, or from any well-defined channel, have been fairly well settled, the title to water which percolates subterraneously has not yet been long enough before the courts of this country and England to establish a definite practice; and therefore an abstract of several recent decisions relating to disputes about the ownership of underground water may be of interest.

An instance of the injustice of the old English common law relating to subterranean waters, when applied to modern conditions, is clearly set forth in a paper read in 1897 before the Institution of Civil Engineers by Mr. James Mansergh, C. E.* Its principal points may briefly be summarized as follows, with the remark that the towns referred to are in England:—In 1891 the corporation of Newark sunk a well into the pebble beds of the new red sandstone formation at Farnsfield, and obtained a satisfactory water supply. The corporation of Nottingham, and five villages in the same neighborhood, are also supplied by wells sunk into this same formation, and the aggregate daily amount pumped from all these wells was six or seven million gallons. The pervious pebble beds have a total area of about 100 square miles, and borings show that they are about 400 feet deep near Nottingham and thicken towards the north. The surface formation overlying these beds is a much broken and porous rock, which permits the rainfall to enter freely into the pebble strata below; and the principal stream in this region is the Dover Beck, which was formerly 13 miles long, but has been reduced in length 3.5 miles, according to the claims of its riparian owners, in consequence of the pumping operations during the past 20 years.

No special complaint, however, arose until 1896, when the corporation of Nottingham applied for authority to sink new wells in the vicinity to supply several other parishes having a total population of about 3,000. As one of the proposed wells would be located only 2.5 miles from that of the Newark corporation, the latter made serious objection and finally asked Parliament to grant it a protective zone of 4 miles radius around its Farnsfield well. This zone would have covered one of the proposed Nottingham wells, and therefore the Nottingham corporation also petitioned Parliament for authority to sink three wells in the same territory over which Newark sought control. Both bills were strongly opposed by other local authorities in the neighborhood and especially by the riparian owners on the Dover Beck, who claimed that their property was being unduly drained by the town wells. A long and expensive argument before Parliament followed, and the Newark bill was finally granted, but with a protective zone extending only to the supposed limits of the present supply; the corporation of Nottingham being empowered to sink only one well remote from Newark's territory.

This manifestly equitable decision was directly contrary to the English law, and may be cited as another instance where Parliament has protected the people against the injustice of their own laws. Under the common law, Newark would have had no redress, even if its Farnsfield well had been completely drained by the wells of Nottingham, and its only remedy would have been to deepen its well and lower its pumps, as it could not be proved that there was any defined channel leading the water from one well to the other. For the same reason the riparian owners could not legally claim damages for the lowering of the stream and the excessive drainage of pasture lands due to pumping from distant wells. This is the law as set forth in the judgment of the House of Lords in the case of Chasemore vs. Richards, rendered in 1859, wherein it is held that "the owner of land containing underground water which percolates by undefined channels and flows to the land of a neighbor has the right to divert or appropriate the percolating water within his own land so as to deprive his neighbor of it; and his right is the same whatever his motive may be,, whether bona-fide to improve his own land, or maliciously to injure his neighbor, or to induce his neighbor to buy him out."

Mr. Mansergh also cited an old case where the water in the plaintiff's well at his brewery had been polluted by the percolation of foul matter from a disused well several hundred yards away. The first court decided that the brewer had no redress, as there were no rights in underground water and therefore the defendant was under no obligation to desist from converting his old well into a cesspool, even though his neighbor's well was thereby injured; but this decision was properly reversed by a higher court in accordance with the dictates of common sense rather than with the strict tenor of the old law.

In the case of surface waters, the law in England and the United States is clear and intelligible. It holds, briefly, that a man must allow the water flowing through his property to pass on to his neighbor downstream, unpolluted and practically undiminished in volume, but he may have the fair and reasonable use of such water in its passage over his land. In the case of underground water, however, the law denies redress to an injured party unless he can prove the existence of a defined channel of communication between his own well and that of his neighbor. Water-courses are thus divided by the law into two distinct classes, viz.: Those having known and defined channels either on the surface or subterranean, and those having unknown and undefined channels. The latter definition applies to percolating waters, which are assumed to ooze through a porous soil, in varying quantity and in uncertain directions; and the law assumes that such water is part of the soil, to be done with as the owner of the land pleases. Its strict application in two Brooklyn cases has, however, led to complicated legal problems which are now before the Court of Appeals of the State of New York for final adjudication. As these cases are of particular interest, an outline thereof is herewith submitted.

The wells sunk into the sand and gravel formations of Long Island near Brooklyn originally yielded an abundant supply of good water almost everywhere. About forty years ago the city began to draw heavily upon this source for a public supply, and by means of impounding reservoirs, deep wells and collecting conduits, it has gradually intercepted the seaward flow of most of the water in a large area of land, and uses it to an amount of over 100,000,000 gallons per day. With the growth of the city, however, the adjoining territory has also developed, and owns of considerable size are growing up which are likewise dependent on the same beds of saturated sand and gravel for their water supply. Under this large and constantly increasing demand, the level of the groundwater is being steadily lowered, and the question of the legal right to this water in districts beyond the jurisdiction of Brooklyn is becoming prominent. Hitherto the old English common law has been held to apply to these underground water supplies, and the city has continued to collect the water without compensation to the owners of drained wells on adjacent property, or to riparian owners along surface streams which have either suffered a large diminution of flow or have dried up entirely, in consequence of the pumping operations.

A test case involving the principle that an appropriator of underground water must pay for the damages sustained by riparian owners on surface streams injured as just stated, was finally brought to trial in 1896. The plaintiff, Walter R. Smith, sued the city of Brooklyn for draining a certain stream and pond upon his property by the operation of a driven-well plant in his immediate neighborhood. The pond was formed by a dam across the stream, and had been in existence for over 50 years, with plenty of water therein at all seasons; it was about 2,400 feet distant from the city's intercepting conduit, whose bottom was 16.8 feet below the bottom of the pond, and the intervening soil was of a sandy and gravelly nature. The supply of water in the stream and pond began to fall soon after said conduit was completed, and it disappeared entirely when the pumping station at Freeport was put into operation; and both stream and pond have remained dry ever since. In the first trial a decision was given in strict accordance with the old common law; but when the case was carried into the Appellate Division of the Supreme Court of the State of New York, the decision was reversed, and the matter was thereupon taken to the court of last resort, which has not yet rendered a final judgment.

In the decision of the Appellate Division of the Supreme Court, 46 N. Y., Supp. 141, the presiding judge held that under the conditions mentioned, "the evidence is abundant to warrant a jury in finding that the disappearance of the brook and pond is due to the drainage of the territory

*Editorial in "Egineering News," Aug. 19, 1897; Vol. 38, p. 120.

where plaintiff's farm is situate, and is caused by the conduits and wells of the defendant in connection with the suction power applied thereto;" also that the old English law does not apply here, because while the city owns the land at its wells and pumps, it did not build the structures upon it for the sole use and enjoyment or that land itself, but used the land to gather and carry water to a distant place for the benefit and profit of strangers who had no claim upon it as against the plaintiff. He further held that the right which exists and has been upheld, relates to the beneficial use of the land for some purpose for which the land can be used, connected with its enjoyment as land for the ordinary purposes of agriculture, mining, domestic use, or improvement, either public or private; also that all legal authorities admit that there are property rights in percolating waters of as high character as in the land itself, and that such water is in fact a part of the land; but he nevertheless deems it monstrous to assert that one land-owner may deliberately and intentionally erect works for the purpose of draining the land of another of its percolating water, and thereby destroy streams, springs, ponds, or wells, and be supported in so doing upon the theory that it is in the exercise of a legal right to the use of the land.

The second case referred to is that of the Merrick Water Company against the City of Brooklyn*, wherein a decision was rendered in 1898 likewise by the Appellate Division of the Supreme Court of the State of New York, and published in 53 N. Y., Supp. 10. In this case the plaintiff collected the water it sold from what was claimed to be an underground stream, supplied by a water-shed particularly described. This stream was said to rise to the surface on the plaintiff's land and flow into ponds which it owned. The defendant corporation had acquired a strip of land north of the company's pumping station, and had sunk wells and erected a pumping plant on it from which water was delivered to the city. The first trial was before a referee, who found that the effect of the defendant's pumping had been to lower the permanent level of the water in the company's well from 7 to 8 feet. The evidence, however, failed to prove the existence of a subterranean stream of water supplying said well, and therefore the case was one of interruption or diversion of percolating water by one corporation from the lands of another corporation, both engaged in collecting the water not for use on the land itself, but for transportation and sale to third persons who had no interest or right of use of the water as connected with the land.

In deciding in favor of the plaintiff the referee based his judgment on the decision in the case of Smith vs. City of Brooklyn, 46 N. Y. Supp. 141, cited above; and in reviewing this judgment and dismissing the complaint, the Appellate Division of the Supreme Court held that the case now before it differed materially from the previous one, for several reasons. Both corporations here sought to obtain the water for transportation and sale; neither intended to use its land for any other purpose than to facilitate the gathering and distribution of water. In this respect their rights were equal, and the same rule was applicable as would apply in case in case either owner desired to improve his land for use. "When both seek to use their land for exactly the same purpose and neither seeks to improve it for the purpose of beneficial enjoyment, but to make a profit from the business carried on, the right to such use must also be equal. Under such circumstances, if one gets more than the other, there can be no more ground of complaint than would exist if both sought to improve their own land, and one secured more than the other, or one was damaged and the other not. As applied to such obligations, the doctrine of reasonable use and relative rights has never been adopted by any of the courts of New York, nor in any other state except New Hampshire." This judgment was, however, not accepted by the plaintiff, and the case was carried to the Court of Appeals for final settlement.

The Supreme Court of Pennsylvania adopted in 1899 the following definition of the rights of land owners to percolating waters, in the case of Brown vs. Kistler et al., 42 Atl. Rep. 885:†—"Water that is in the earth and finds its way through the soil by percolating or seeping, and has not a defined flow in a stream either underground or above the ground, is absolutely the property of the man who owns the land in which that water is found. But where there is a defined stream, whether on or below the surface, or a flow of water that is visible, the rule is different; and if there is a well-defined flow in a channel or stream underground, so that it is not the mere percolating of water through the earth, but a well-defined flow, and it flows from the land of one above to the lands of another, there the owners of the land through which it flows have the right to use the water within certain bounds. The upper owner has the right to use the water for household purposes, and for watering stock and other purposes, to an extent that is not unreasonable, bearing in mind the size of the stream. Of course, the upper owner of a large stream might divert a large quantity of water, and it might be permissible or reasonable for him to do it, where the taking of the same quantity from small stream would not be reasonable."

A very interesting exposition of the English law relating to underground water†† was given in March, 1900, by an eminent jurist, Mr. J. Shiress Will, Q. C., before the Surveyors' Institution of London; and as the judicial rulings referred to may have a bearing in similar litigations in the United States, the following abstract of the paper may perhaps be useful:—The law with regard to the ownership of underground water first became definitely settled in 1859 by the case of Chasemore vs. Richards, 7 House of Lords Cases, 349. The plaintiff occupied an ancient mill on the River Wandle, and for more than 60 years he and his predecessors had used and enjoyed as a right the flow of the river for the purpose of operating this mill. The defendant represented the corporation of Croydon, which had sunk a well 74 feet deep in its own land about one-quarter of a mile from the river, and pumped therefrom large quantities of ground water alone to supply the town. This underground water, which flowed in no definite channel, but merely percolated or oozed through the soil, would otherwise have found its way into the river above the mill, and thus have become of appreciable value or use for operating the same. The judgment of the House of Lords was unanimous that:

"The right to running water has always been properly described as a natural right, just like the right to the air we breathe; they are the gifts of Nature, and no one has a right to appropriate them. There is no difficulty in forcing that right, because running water is something visible, and no one can interrupt it without knowing whether he does or does not do injury to those who are above or below him. But if the doctrine could be applied to water merely percolating, as it is said, through the soil, and eventually reaching some stream, it would always be a matter that would require the evidence of scientific men to state whether or not there had been interruption, and whether or not there had been injury. It is a process of Nature not apparent; and therefore such percolating water has not received the protection which water running in a natural channel on the surface has always received."

Several earlier judicial decisions were also cited. In the first case, the plaintiff owned a piece of land on which there was a cotton mill and a well for the use of said mill. The defendant owned some land about three-fourths of a mile distant, and sunk therein two coal pits at different times, in consequence of which the supply of water in the plaintiff's well was so much reduced as to render it worthless. The court held that the owner of a piece of land may dig therein and apply all that is there found to his own purpose at his own pleasure; and that if, in the exercise of such right, he intercepts or drains off the water collected from underground sources in his neighbor's well, this inconvenience to his neighbor falls within the description of "damnum absque injuria," which cannot become the ground of an action.

In the next case the plaintiff owned some paper mills on a stream from which the defendant attempted, by means of a well on its bank, to divert water in two ways, firstly, by taking water already in the stream by lateral percolation therefrom into said well, and secondly by intercepting with said well percolating ground water which would otherwise have found its way into the stream. The plaintiff was sustained in his first point, but not in the second.

In the land drainage case of Broadbent vs. Ramsbotham, 1856, it was held that the rainfall on a hill at the foot of which a brook runs, may be appropriated and diverted by the owner of the land before it reaches the brook, or is not already flowing in some natural channel. In this case there was no water-course at all, but merely a shallow depression or basin in the land, and the rain water lodged therein to a certain depth, above which it overflowed at the lowest points and spread out over the adjoining surface. The owner of the land had therefore a clear right to drain this shallow pond and get rid of the inconvenience at his own pleasure.

In the case of Dudden vs. Clutton Union, 1857, there was a spring from which the water flowed in a natural channel or stream to the plaintiff's mill, and the defendant made a tank in the ground at said spring, caught the water as it rose from the earth, and diverted it to anther locality. The defendant did not here sink a well and obtain percolating underground water, but took the water after it had arrived at the spring-head and prevented it from going down the natural channel, although it had not yet actually entered it. The plaintiff's action was accordingly sustained.

In the case of Regina vs. Metropolitan Board of Works, 1863, the overflow of a natural pond fed by several copious springs in its bottom, formed a rivulet which ran through another portion of the estate wherein the pond was located, and supplied water to cattle, gardens and other ornamental ponds. The surface soil for considerable depth was gravel, and below it was a bed of clay. In building a certain deep sewer, the defendant cut through said beds of gravel and clay at distances of from 17 to 153 yards above the estate, whereupon the said springs ceased to flow and the pond and rivulet became dry. Although the Act authorizing the construction of the sewer provided for compensating parties prejudicially affected thereby, it was held that, independently of the statute, the owner was not entitled to compensation, as the effect of the sewer was only to intercept underground water which would otherwise rise into said pond.

In the case of The Grand Junction Canal Co. vs. Shugar, 1871, the defendant built a sewer or drain near to and below the bottom of a natural pond, whose outlet had been made a feeder of the canal. Owing to the faulty construction of the drain, some water was abstracted by lateral percolation from both the pond and the outlet channel, although more damage was claimed to have resulted from the interception of subterranean and surface waters which naturally flowed into said pond. The plaintiff's action was sustained solely on the point that some water was abstracted from an open running stream, as the evidence to this effect was clear; and the court held that "if the underground water cannot be got at without touching the water in a defined surface channel, it cannot be got at all."

In subsequent comments on this decision it was remarked by one judge that the case was "one in which there was a direct tapping of an overground stream flowing in a defined channel, and not merely a withdrawal of percolating underground water;" while another judge in 1894 read it as "one in which subterranean water had passed into a defined channel from which it was afterward abstracted."

Two other cases occurring in 1873 and 1892 were cited which involved the drainage of springs and wells by mining operations, and in both it was held that the interference was "with water which is underground, and not shown to be flowing in any defined stream, but percolating water."

The cases of Bunting vs. Hicks, 1894, and Mostyn vs. Atherton, 1899, are similar to that of Dudden vs. Clutton Union, already considered. In the first the defendant impounded and abstracted water for brick making purposes from a small rivulet shortly below the spring which formed it, while the plaintiff was a riparian owner further down. In the second the defendant was the owner of an ancient flowing well whose discharge had run for centuries through a definite channel on the surface of the plaintiff's land. The defendant attempted to abstract and sell the yield of the well. Both cases were decided in favor of the plaintiff, as it was obvious that no underground percolating water was taken, but water which had actually come to the surface or was flowing in a defined channel near the same.

In the Irish case of Ewart vs. Belfast Poor Law Guardians, 1881, the plaintiff had on his land a copious spring of great purity and value for bleaching purposes, the discharge of which flowed through his land in a defined surface channel. The defendant acquired the right to make borings on an adjoining higher piece of land for the purpose of obtaining a water supply for a village in the vicinity, and ultimately found a large underground flow. Trenches were then excavated at the lower portion of said higher land, which prevented the under-

*Editorial in "Engineering Record," Sept 10, 1898; Vol. 38, p. 309.

†"Engineering Record," May 6, 1899, Vol. 39, p. 520.

††Reprinted from "Journal of Gas Lighting" in "Water and Gas Review," N. Y., April and May, 1900.

ground water from flowing down the hill to the plaintiff's land, whereupon his spring ceased to flow. There was conflicting expert evidence as to whether the diverted water used to flow in a defined channel underground, "in the sense of a channel capable of being ascertained and defined by opening the ground by excavations;" but it was established that before issuing from the spring the water had not previously flowed upon the surface in the form of a continuous stream in a defined channel.

The court here decided against the plaintiff, although it assumed that the water did flow underground for some distance at least in a definite channel, "but that its course was unknown, invisible and undefined by human knowledge. This is the only sense in which the words 'defined channel' can be used in deciding upon rights. It is impossible to recognize a natural right which would subject the lands of another to the burden of maintaining an unknown flow of water, whatever be the geological character of its channel, without introducing every difficulty which has already prevailed to prevent the recognition of such a right in respect of 'percolating' water strictly so called. It is impossible to find the test of the existence of either natural rights or acquired easements in ex post facto geological investigations. Yet it is by some such means alone that any difference could be discovered between oozing or percolating water, and water running through or collecting in underground fissures."

Another Irish case, Black vs. Ballymena Township Commissioners, 1886, was also cited. The defendant had made an excavation near the River Quolic and obtained therefrom a water supply for the town. The plaintiff represented several mill-owners on the river below this excavation. It was claimed that the excavation tapped water which was not percolating or oozing, but flowing through a certain defined underground channel; also that it withdrew water directly from the river. The court here decided in favor of the plaintiff, as it was found to be a fact that "a known and visible surface channel" had formerly existed along the course of the alleged underground defined channel, but had become filled up with stones and soil from the adjoining high ground, and that the water continued to flow under the stones and other material through a defined channel which had been tapped; also that the excavation close to the bank of the river did abstract water actually flowing in the same.

A number of cases were also cited which involved questions of the pollution of underground water, and the support of buildings on saturated substrata in adjacent lands; but as reference to the former has already been made, and the latter are associated more particularly with building operations, a more extended notice thereof may here be omitted. The paper concludes with a consideration of the occasional rivalry of municipal or private corporations in securing supplies of ground-water from the same territory, as exemplified in the Newark-Nottingham case, previously described.

While the foregoing citations of the law relating to underground waters are by no means complete or exhaustive, they are probably sufficient to give a fair idea of its intricacy, and also of the precautions that must be taken in establishing a driven-well plant to avoid future litigation.

COST OF WELLS.

The expense of sinking a tubular well manifestly varies within wide limits with its size and depth, the character of the strata penetrated, the devices and tools employed, and the cost of labor, power and materials in the locality. For rapid work in earth formations, expensive outfits embracing steam engines and pumps are required, and the charges necessarily include a portion of the cost of the plant, as well as that of its transportation and erection. Such outfits are used with advantage only where wells of large size and considerable depth are to be sunk. On the other hand, smaller tubes are readily driven to moderate depths with quite simple apparatus, although the time required is relatively much longer. The principal difficulty in well sinking operations in earthy strata arises from large stones and boulders, and where these are encountered extensively the cost is greatly increased. It must also be remembered that a large percentage of the expense is embraced in the strainer and tubing. To give some idea of the prices that have been paid in recent years for sinking wells of different sizes and depths in earth formations, the following memoranda are submitted:

For a single well at Galveston, Tex.,* sunk to a depth of about 3,000 feet through various kinds of earthy strata, and with casing pipe ranging in diameter from 22 inches at the top to 6 inches at the bottom, the latter size finally being carried up to the surface, the contract price in 1890 was $25 per lineal foot, including casings. For sinking twelve 12-inch wells to an average depth of 500 feet in clayey and sandy deposits at Savannah, Ga.,† in 1892, the contract price, including casings, was $4.50 per lin. ft. to a depth of 430 ft., and $5 per lin. ft. for all below this limit. For a single 10-inch well sunk in 1894 to a depth of 290 ft. in the sandy subsoil of Long Island near Brooklyn, the contract price, including casing, was $3.17 per lin. ft. Another single 10-inch well near Pukwana, S. D.,†† sunk in 1896 to a depth of 907 ft. through clayey strata in which a bed of soft chalk rock 239 ft. thick was interposed, cost on the average $0.73 per lin. ft. complete. At Larned, Kan.,§ an 8-inch well sunk in 1888 to a depth of 910 ft. cost $3.35 per lin. ft. At Dillon, Mont.,§ a 6-inch well sunk in 1886 to a depth of 470 ft. through gravel, clay and sand, cost about $10 per lin. ft., while a similar well 521 ft. deep near Helena, Mont.,§ cost only $6 per lin. ft.

At Ocean Beach, N. J.,** a 3-inch well 480 ft. deep cost $2.36 per lin. ft. in 1886. At Brookline, Mass.,§§ during 1892-4, the average cost for 118 permanent 2.5-inch wells sunk to an average depth of 50 ft. in gravelly soil, was $47.90 per well, or $0.96 per lin. ft., which sum includes the proportional cost of all labor, tubing, strainers, top-castings and stop-valves, besides that of driving and pulling up 41 wells at bad locations; furthermore, the cost of the labor alone for the driving of said wells was $0.21 per lin. ft. on the average. At various places in central and western New York during 1890-8, the cost of the labor alone for driving and pulling up a large number of 2-inch pipes, for test borings 20 to 50 ft. deep in sandy, clavey and gravelly subsoils, ranged from $0.15 to $0.30 per lin. ft., according to depth, locality and character of material.

In the alluvial valleys of certain portions of South Dakota and other western states, where wells are easily driven and there is considerable competition among men engaged in the business, 2-inch wells from 250 to 300 ft. deep cost about $75; while in other localities where they must be sunk to depths of 350 to 400 ft. in soils more liable to contain large pebbles and stones, such 2-inch wells may cost as much as $300. Similarly, 3-inch wells from 300 to 350 ft. deep in the former places cost about $300, while in the latter the expense for 3-inch and 4-inch wells ranges from $400 to $1,000. In Nevada, wells from 2 to 6 inches in diameter and 50 to 300 ft. deep in earth formations, cost from $0.60 to $6 per lin. ft., according to size, depth and locality; while in Texas and Colorado, the usual prices a few years ago for the labor alone of driving tubes from 3 to 6 inches in diameter in similar material, ranged from $0.60 to $1 per lin. ft. for the first 100 ft. of depth, with an addition of from $0.30 to $0.50 per ft. for each increase of 100 ft. or part thereof. For plain wrought-iron tubes or casings, the prices range from $0.12 and upward for 2-inch, to $0.60 and upward for 6-inch per lin. ft., according to place and facility of transportation. In the central and eastern states the prices for driving single wells in earth are in general not much different from those above mentioned, and vary with the size, depth, nature of the soil and degree of local competition.

The expense of wells drilled through rock formation is also variable within wide limits, and depends upon the size and depth of the boring, the hardness and inclination of the rocky strata, the amount of casing pipe required and the transportation costs of the necessary machinery and supplies. Experienced drillers assert that the cost per foot of an 8-inch boring in hard granite and trap rock, is at least one-fourth more than for the same hole in limestone, and at least twice as much as that of a 6-inch hole in soft shales, slates and sandstones. Certain hard clay slates, on the other hand, require twice the time to penetrate which is needed for loose mica schist or soft, decomposed sandstone, and a very hard quartzite is often far more troublesome to drill than trap or granite. Prof. O. S. C. Carter of Philadelphia, who gave much attention to rock-drilling operations in Montgomery Co., Pa., states†† that in one instance the progress made with a 5.625-inch drill, 20 ft. long, weighing 700 lbs. and guided so as to make a round hole in a stratum of such quartzite, was only six inches in 10 hours; while for other formations the following rates of penetration in feet per hour with the same drill were observed: Hard clay slate, 0.45; hard sandstone, 0.50; hard limestone, 0.55; mica schist, 0.70; soft micaceous sandstones, 1.00 to 1.85. It may also be remarked that when the strata are sharply inclined, there is considerable difficulty in keeping the bore hole truly vertical; that much time is often lost in fishing or grappling for jammed, broken or lost tools, and that all of these operations are more tedious as the depth increases.

To indicate how much patience and skill is required when the work is interrupted by an accident, it may be mentioned that after the famous Grenelle well at Paris had reached a depth of 1,254 ft., a length of 270 ft. of the boring rods suddenly broke off and fell to the bottom. Nearly fifteen months of constant labor was needed to pick up the broken parts. A similar accident occurred a few months ago at an oil-well boring in the valley of the Monongahela River about 25 miles from Pittsburg, Pa. The drill had attained a depth of 5,532 ft., when the cable to which the string of boring tools was attached broke at a point about 1,000 ft. above the drill bars, and dropped into the hole. At last accounts from the work, (March, 1900,) the men were still engaged in trying to recover the lost objects. It is therefore not surprising to learn that some of the best known deep borings in this country and abroad have required years of unremitting labor for their completion.

In wells of less depth than 1,500 ft., however, such accidents are of comparatively rare occurrence among experienced drillers, and a few weeks or months is generally sufficient to finish a well from 500 to 1,000 ft. deep in ordinary rock. For drilling a 6-inch well 611 ft. deep at Lansdale, Pa., through red shales and hard clay slates containing much quartz, six months were required; while in the Pennsylvania oil fields, where the geological formations are said to be more favorable for rapid work than in most other parts of the world, wells 1,700 ft. deep have been drilled in 90 days. The most rapid rate known was obtained a few years ago by the boring of an 8-inch well 500 ft. deep in granite and other hard rock at Westchester, N. Y., in 19 working days.

Although the cost of penetration varies considerably in the different kinds of sedimentary rocks, such as sandstones, limestones, slates and shales, yet expert well-drillers in various parts of the country have gradually become so familiar with the local formations of their own regions that they prefer to perform their work at certain average prices per foot of depth, rather than to do it at a separate rate for each kind. If, however, granites or other hard crystalline rocks are encountered at unknown depths, or if the rock is covered with a large thickness of earthy material, two or more different prices are generally given, according to the general character of the strata and the depth of the boring. It may also be expected, as in the case of wells driven in earth formations, that somewhat lower rates will be named for making a number of borings in the same locality, than for a single one.

In Philadelphia, Pa., contracts for the labor alone of drilling 8-inch holes to a depth of 500 ft. are often made at $2.75 per foot, and at $3 per foot for any reasonable additional depth; to these prices must be added the cost of the necessary 8-inch casing pipe in the earth above the rock, which is about $0.50 per ft. A common practice for artesian wells in that city is to first put down an 8-inch pipe, and then place a 6-inch pipe inside, the space between the two pipes being filled with hydraulic cement. The usual price charged for such a well is about $4 per ft., which includes the drilling, casing pipes and testing, complete. In Montgomery county, Pa., 6-inch wells from 100 to 200 ft. deep in hard slate rock generally cost about $2 per ft., while in the Pennsylvania oil region the same work is done for about $1 per ft.

In the shales and conglomerates of the Catskill Mountains, the shales of the upper part of the Hudson River, and the shales and soft limestones of central and western New York, 5-inch wells of modperate depth are drilled at from $1.50 to $2 per ft., while for 6-inch holes in the harder sedimentary rocks, the rates are from $2 to $3 per ft. In Illinois and Wisconsin the cost of 6-inch and 8-inch wells 500 to 1,000 ft. deep is from $3 to $5 per ft., in-

*"Engineering News," Oct. 24, 1891, and Aug. 11, 1892.

†"Engineering News," June 8, 1893.

††U. S. Geolog. Survey Rept. 1896-7.

§U. S. Census, 1890; Report on Irrigation, by F. H. Newell, 1894.

**"Engineering Record," 1886, Vol. 14, p. 372.

§§Fr. N. E. W. W. Assoc., 1897, Vol. 11, p. 195-9.

††Jour. Franklin Inst., Sept., 1893; Vol. 136, p. 230.

cluding the necessary casing pipe down to the rock; for wells not more than 6-inches in bore and 1,000 to 1,500 ft. deep, the total expense is usually about $3,000; and for wells of larger size with depths of 2,500 to 3,000 ft., the cost ranges from $6,000 to $12,000. At Rockford, Ill., the average cost of four wells 8 to 6 inches in diameter and 1,300 to 1,996 ft. deep, was $2.97 per ft. in 1875.* In North Dakota, the average cost of 4, 5 and 6-inch wells, 500 to 1,000 deep in shale and sandstone formations, is from $3.50 to $6 per ft.; while in Denver, Col., numerous 6-inch wells are said to have been drilled in 1886 to depths of from 300 to 900 ft., at a cost of $2 to $2.50 per ft., exclusive of the casing pipe.

In general, it may be considered fair to estimate the cost of boring 6-inch holes in sedimentary rock formations at from $2 to $3 per ft. for the first 500 ft., according to their hardness, and adding $0.50 per ft. for each additional 500 ft. of depth, along with the cost of the casing; but in order to exhibit in somewhat better detail the relation of cost to the size and depth of deep wells in rocky strata, the following table has been compiled from various sources.

TABLE NO. 3, SHOWING SIZE, DEPTH AND COST OF A NUMBER OF WELLS IN ROCK FORMATIONS.

Location.	Year of completion.	Diam. in inches.	Depth in feet.	Cost.
Place Hebert, Paris.	1888	41.7	2,359	$480,000
Schladebach, Germ'y.	1892	11—1.3	5,735	53,000
Ashland, Wis.	1891	8—4	3,095	14,000
Alma, Mich.	1889	8—4	2,876	10,000
Mandan, N. Dak.	1890	10—4	2,000	10,000
St. Louis, Mo.	1854	9—3.5	2,199	10,000
Canton, Ill., No. 1	1882	4	2,500	8,000
Canton, Ill., No. 2	1895	14—6	1,646	4,270
Harvard, Ill.	1892	12—7	900	7,000
Princeton, Ill.	1894	9.5—4.5	2,092	7,000
Barry, Ill.	1880	6	2,510	6,000
Minonk, Ill.	1893	10—6	1,755	5,000
Sarpy County, Neb.	1891	8	1,430	5,000
Rockford, Ill., Av'ge.	1875	8—6	1,538	4,560
Ellendale, N. Dak.	1885	4.4—3.7	1,087	4,000
Galesburg, Ill.	1896	14—6	1,226	4,000
Yakima County, Wash.	1890	6	630	3,400
Highland Park, Ill.	1887	8—5	2,200	3,200
Oak Park, Ill.	1894	6.5	1,568	3,000
Boyd County, Neb.	1895	8	760	2,000
Red Bud, Ill.	1887	3	580	1,500
Omaha, Neb.	1891	6	1,060	1,000
Average of 20 wells in U. S.		6.7	1,683	$5,647
Average cost per foot in U. S.		"	"	$3.36

BIBLIOGRAPHY.

In the preparation of this monograph, the author has availed himself of amny pubcations, a number of which have been mentioned either directly in the text or in foot notes; and due acknowledgement is herewith made for much valuable matter which has been incorporated in the foregoing pages either wholly or in condensed form. Space is not available for the enumeration of all the works consulted, and hence reference can here be made only to those which were found specially useful, and are probably accessible in most of our large public libraries, viz: Engineering News; Engineering Record; Water and Gas Review; Fire and Water; Reports and Papers of the U. S. Geological Survey; Trans. Am. Soc. of Civ. Engrs; Jour. Western Soc. of Engrs; Jour. New England Water Works Assoc.; Proc. American Water Works Assoc.; Jour. Franklin Institute; Proc. American Public Health Assoc.; Goodell's "Water Works for Small Cities and Towns;" Fanning's and Folwell's "Water Supply Engineering;" Lueger's "Wasserversorgung der Stadte;" Bechmann's "Distribution Des Eaux;" Mason's "Water Supply from a Sanitary and Chemical Standpoint;" Reports of the Mass. State Board of Health; and the recent encyclopedic treatises on Hygiene in English, German and French.

*"Engineering Record," 1888, Vol. 18, p. 312.

Kansas City does not permit garbage wagons to appear on its business streets after 7:30 in the morning.

* * *

—"Yankton, S. D., August 16, 1900.—Please find express order for $3 for renewal of my subscription to 'City Government.' It is a splendid journal. I loan it to several city officers."—Edw. D. Palmer.

Streets and Lighting.

The Construction of Asphalt Pavements.*

By Geo. W. Tillson, Mem. Am. Soc. C. E.

Just 30 years ago the first asphalt pavement was laid in this country, at Newark, N. J. At that time nothing was known of the durability or the proper methods of construction of a pavement of asphalt. A great many experiments and trials were made in laying such pavements during the next 15 years, actual records being kept of the methods employed, so that proper calculations could be arrived at as to the proper construction. At the present time, however, the irregularity of laying an asphalt pavement has been standardized, and one can say with comparative certainty what is the best method of construction.

In order to make a good asphalt pavement the material should be good; it should be properly mixed, and well laid on a good foundation.

Although all pavements require a good foundation, with asphalt it is absolutely essential, as the asphalt itself has no inherent strength, but simply serves as a cushion to transmit the load to the base which must sustain the weight.

Pavements have been laid with comparative success over wood, cobblestone, granite and Belgian block pavements as a foundation, but at the present time it is conceded that a cement concrete base of proper materials and thickness, according to the traffic, is the best for all conditions. It is not proposed, however, to enter into a detailed account of the construction of the concrete base, as that will be the same for pavements of all characters.

The original asphalt pavements consisted of a wearing coat two inches thick, and cushion coat one-half inch in thickness. The cushion coat was first laid and rolled, and the wearing coat then laid upon it. This did not give general satisfaction, for if the base contained any moisture the hot material caused the moisture to evaporate, and the escaping steam lifted the cushion coat from the concrete, forming bubbles, so that it was difficult to make the asphalt adhere to the base, and, also, in many cases to prevent the wearing coat from slipping on the cushion coat. To obviate this difficulty it was deemed best to lay a binder of so-called "binder course" upon the concrete. This binder course consisted of broken stone, in size from an inch in diameter down to that which would pass through a 10-inch sieve, cemented or held together by asphaltic cement. This binder has been laid of different thicknesses, but as its object is not to form a portion of the pavement proper, but simply to act as a medium to connect the wearing surface to the concrete, the least thickness that will do this, is sufficient. One inch has been successfully used and that is considered standard at the present time, although some cities use a binder coat one and one-half inches in thickness, but, considering the principles spoken of above, there does not seem to be anything gained by the extra half inch.

In considering the wearing surface it must be remembered that an asphalt pavement is a bituminous concrete with the particles of the sand held together by the asphaltic cement. Asphalt itself may be defined as any hard, natural bitumen, or any material bearing such bitumen in any appreciable quantities. The bitumen forming the asphalt has been considered by chemists to be divided into two parts, petrolene and asphaltene, or, as some choose to call it, active and inert properties. That portion of the bitumen which is soluble in petroleum ether is generally considered to be petrolene, and the remainder, or the quantity soluble in chloroform, or carbon-bisulphide, is considered aspheltene. The former is the active and valuable part of the product; while the latter is of no particular value.

Whether an asphalt is suitable for a pavement or not is hard to determine by any examinations whether chemical or physical. All bitumens do not make good pavements. A practical, commonsense method of testing a new asphalt, while perhaps not scientific, would be to take some standard asphalt, like the Trinidad or Bermudez, and make careful physical and chemical examinations of it, and then make similar examinations of the proposed asphalt and then compare results. In this way probably would be obtained the most satisfactory conclusions regarding the new asphalt, but the only sure test is to test it in the pavement, and then safe conclusions cannot be drawn until after a lapse of two or three years.

Very few asphalts are known. No asphalt as it is put on the market will make a good pavement without some treatment. It is either too hard or too soft, and must be fluxed with some other bitumen, in order to bring it to the proper consistency. This material after being fluxed is called asphaltic cement. As a rule, the asphalts in use contain too little petrolene and are fluxed with petroleum residium or maltha, which contain a large proportion of pretrolene. The pretrolene in the flux acts as a solvent to the hard asphaltene of the asphalt, and produces a compound which has more cementitious values than the original asphalt. The quantity and amount of flux to be used depends upon the character of the asphalt and the character of the flux.

Just what is the best material for these fluxes is at present a mooted question. The greater portion of asphalt pavements that have been laid in this country, and those that have made it a success have been laid with petroleum residuum as a fluxing agent. It is claimed by some, however, that this being a volatile substance, the pavement does not last as long with it as it would with a flux that is more stable. Maltha and asphaltic oils have been used by those who are opposed to residuum, and with good results. It is certain that either will give a good pavement when properly used, and experience alone can demonstrate whether there is enough difference between the two to be worthy of practical consideration. The hardness of an asphaltic cement is important. The consistency is brought about by the flux. It should be of such a nature as to give a pavement that will not become too soft in hot weather, and one that will not be so hard as to crack in cold weather. To get the mean between the two is important, and sometimes difficult. The exact consistency of the cement is tested by machines, one made by the late Professor Bowen, and the other by Mr. A. W. Dow, the present inspector of asphalts and cements in Washington. While differing in detail and in numerical results comparatively, they are probably of equal merit. They

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are both based on the principle of the amount of penetration shown by a needle weighted with a certain amount and resting on the asphaltic cement for a given length of time. The cement must be kept at a regular temperature, and 72 degrees F. is generally taken as a standard. The cement is maintained at this temperature by being kept in water of 72 degrees. The mixture for the wearing surface is made of sand, pulverized mineral matter, and the asphaltic cement just described.

There is considerable difference in the opinion of asphalt contractors as to what size of sand gives the best results, some favoring one that is fine, and others one that is coarse. It does not seem, however, that the exact size of the sand is so important as it is, that it should be evenly graded so that the voids be as small as possible. A sand whose largest particles will just pass through a 10-mesh sieve, and grading from that down to dust will give good results. The sand, however, should be of hard, sound mineral matter, free from any organic substances whatever, and the gradations should be even and regular. On account, however, of the difficulty of obtaining such sand as above described mineral matter is added to assist in the filling of the voids. It is a well-known fact that in all of the concretes when the aggregate is of a hard, durable material the less the amount of voids, the more solid and complete will be the mixture, so that it is important that the amount of mineral matter be properly regulated, the exact amount being determined by the character of the sand. It should be so ground that it will all pass a 30-mesh sieve and 80 per cent. of it should pass one of 100-mesh. This mineral matter when first used was always carbonate of lime. This probably arose from the fact that the rock asphalts of Europe are formed of limestone, and it was supposed that by the use of the carbonate a substance approximating the European pavements would be obtained. This would probably be so if the temperature of the mixture was 1,200 degrees or 1,400 degrees, as it would require at least that heat to allow the carbonate to become impregnated with the bitumen. It is probable, however, that the action of the powdered mineral matter is mechanical rather than chemical and pulverized silica has been used to a certain extent with good results. It is, however, more expensive than the carbonate of lime, and for that reason not used to any great extent. Besides assisting in filling the voids the carbonate of lime also makes the pavement harder. The amount used varies, but ranges from six to 10 per cent. The exact quantity of asphalt to be used must depend entirely upon the amount of contained bitumen. Refined Trinidad contains about 55 per cent., Alcatraz 80, and Bermudez 90 of bitumen, and when it has been decided how much bitumen is required in the pavement, knowing the quantity in the asphalt, the proportions can easily be calculated. At the plant the sand is heated to a temperature of about 450 degrees, when it is dumped into the mixing box, the carbonate of lime added at once, and after a little mixing the asphaltic cement is also added, the entire operation of mixing consuming about one and one-quarter minutes.

The asphaltic cement for the binder is generally somewhat softer than the wearing surface, having from 25 to 50 per cent. more flux added in the mixing. The cement and stone are mixed together in about the proportions of 20 gallons of the cement to one cubic yard of stone. It is then hauled to the street and laid so as to produce the required depth after being rolled.

The wearing surface is next spread upon the binder in such quantity as will produce the required thickness. The exact depth is obtained more by the judgment of the rakers than by the actual measurement, although, as a rule, two and one-half inches of the loose material will compress to two inches after thorough consolidation. After being dumped from the cart the material should be raked out smoothly and evenly and freed from all lumps, when it should be lightly rolled with a hand-roller, and then covered with a thin coating of hydraulic cement. Another roller of about five tons weight should follow to give the initial compression, and then the pavement be given its final compression by a roller weighing not less than 10 tons or 250 pounds per inch of width. The object of the different rollers is to give the compression by degrees, so that the weight may be applied vertically in all cases. If a too heavy roller be used at first the material is apt to be pushed ahead rather than compressed vertically, and an unevenness be produced which is very hard to be smoothed out by subsequent rolling. The rolling should be carried on continuously until thorough consolidation is brought about, lengthwise of the street, at first, and crosswise and diagonally whenever the width of the roadway will permit. The amount of rolling required depends a good deal on circumstances, but the rollers above described should have no difficulty in consolidating, under ordinary circumstances, 2,000 square yards in 10 hours.

The material should be brought to the street at a temperature of not less than 250 degrees and 280 degrees or 300 degrees are even better, especially if the temperature is cold, as the consolidation must be brought about before the material has become cooled. At just what temperature the laying of an asphalt pavement should be discontinued is a question that has not been definitely decided. When this has been definitely fixed in specifications it is generally put at about 40 degrees. While it is advisable to lay asphalt at temperatures of 70 degrees or over, good results have been obtained when laid at 10 degrees above, and sometimes at zero, although the practice is not to be commended. In ordinary weather, and with ordinary length of hauls, the temperature of the material will not lose more than 15 degrees or 20 degrees in transit from the works to the street.

It is a well known fact that the action of water has a deleterious effect upon asphalt. While the advocates of some varieties claim that their asphalt is affected less than others, all cities take special precaution in laying the gutters to prevent the action of the water. In some places the authorities go so far as to lay a gutter of some imperishable material, such as brick or granite, but the general plan is to pave with asphalt to the curb; and, while there is no question that there is more decay in the gutters than on the street, the advantage of having the entire street paved with asphalt will offset the small extra cost of repairs to the gutters. In order to prevent, however, the action of water as much as possible, a strip in the gutter about one foot wide is painted with asphaltic cement and ironed with hot smoothing irons. The object of this is to saturate the pores of the asphalt with bitumen, and thus prevent the penetration of the water which produces the oxidation of the bitumen. In doing this, however, care should be exercised not to have the irons too hot; as iron will stand temperatures of perhaps 1,000 degrees before being visible to the eye, it would be possible to have the irons so hot as to materially damage the asphalt, and thus add to the disintegrating effect rather than prevent it.

Pavements laid as above described should last 10 years with little repairs and from 18 to 20 before requiring resurfacing, under ordinary conditions.

The Value of Chemical Tests on Asphalt Mixtures.*

By W. H. Broadhurst, Chemist, Department of Highways, New York City.

The object of specifications for the manufacture and laying of asphalt pavements being to define and secure final results rather than prescribe certain definite and fixed formulas, the contractor should be allowed some latitude in proportioning the ingredients of the mixture for the wearing surface. Futhermore, asphalts very largely in proximate composition vary and each requires special treatment; hence, to specify limits for the percentage of each ingredient of a paving mixture, suitably both for asphalts which are practically pure bitumen and for those which contain a large percentage of mineral matter, would require so wide a range in formula that the specification would fail of its purpose. In order therefore, to admit of the use of the numerous asphalts now on the market and of the various grades of sand advocated by different contractors, the specifications now in use for laying asphalt pavements in New York city describe the manufacture of a standard pavement mixture followed by a general clause of which the following is an abstract:

"Whatever the character of the asphalt used or the manner of manipulation and laying, the pavement obtained shall conform to the following general requirements: The pavement when laid shall be equal in consistency, surface, and durability to the standard pavement made as heretofore described. It shall contain no water nor appreciable amount of light oils nor matter volatile at a temperature under 250 degrees Fahr. It shall yield when extracted with bi-sulphide of carbon and after the evaporation of the solvent, not less than nine nor more than 12 per cent. of the pure bituminous matter. All of the mineral matter shall pass a 10-mesh per-linear-inch sieve, and not less than 15 per cent. shall pass a 100-mesh per-linear-inch sieve, while the remainder shall be graduated between these limits."

Such a clause admits of no ambiguity and prescribes certain definite requirements which cannot be violated to any great extent, provided the mixture be tested from day to day throughout the course of the work.

Asphalt surface mixtures may be regarded as composed of but two ingredients,—cementitious bitumen and mineral particles (sand and mineral dust) graded from coarse to fine so as to reduce the per cent. of voids to a minimum. In examining these mixtures, the points to be considered are the quantity and quality of the contained bitumen, and the size and quality of the mineral particles. The percentage of bitumen is the first point to be considered. An asphalt pavement as laid should never contain less than nine per cent. of bitumen soluble in

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carbon bi-sudphide or chloroform. Any less percentage seriously limits the life of the pavement. Contractors who have long-time maintenance contracts generally use a fine sand and add 10 per cent. or more of bitumen. In other cases where future economy is not an object, the mixture is quite likely to run dangerously near the nine per cent. limit and this is quite characteristic also of thhe shoresighted policy of some contractors who lay asphalt under a ten-year guarantee.

The quality of the contained bitumen is the second point to be determined and should always be considered in connection with the consistency and quality of the asphaltic cement before it is mixed with the sand. The following procedure is recommended: A sample of asphaltic cement should be taken from the "works" from day to day and its degree of consistency or penetration determined by use of a penetration machine. An equal amount of bitumen (about five grams) is then to be extracted with chloroform from both the asphaltic cement and the pavement mixture taken from the street, the solvent thoroughly evaporated in each case under the same conditions and the degree of penetration of the bituminous residues determined. That from the street mixture will be harder according to the degree of heat to which it was subjected when spread on the sand. It is readily apparent that the character of the bitumen may be greatly altered by admixture with overheated sand. The treatment which these uncertain asphalt hydro-carbons are required to undergo at this stage in the manufacture of the mixture, is a severe test even at the usual temperature of 325-350 degrees F. Each sand particle becomes coated with a thin film of asphaltic cement which is constantly exposed during mixing to the air. If these sand particles reach a temperature of 350-450 degrees F., or higher, caused by overheating in the drums, a part of the asphalt oil, or "active bitumen" is driven off and another portion probably converted into "asphaltene." The percentage soluble in petroleum naphtha, of the pure bituminous matter in the cement will therefore be considerably less after it has been mixed with over-heated sand. The petroleum-naphtha-soluble content of the pure bituminous matter in the cement before and after mixing will therefore give us considerable information as to how far the bitumen has been changed in the process. The writer recently examined samples of a section of pavement which worked very stiff when laid, and which was presumed to have been over-heated. The petroleum naphtha and chloroform extractions gave the following results:

	Per cent. of total bitumen in sample	Per cent. of total bitumen soluble in petroleum naphtha	Per cent. of total bitumen insoluble in petroleum naphtha .....
Asphaltic cement from "works"	98.12	80.29	19.71
Paving mixture No. 1.... (Taken from street).	11.01	73.75	26.25
Paving mixture No. 2 .... (Taken from street).	9.42	64.96	35.04
Paving mixture No. 3..... (Taken from street).	8.66	61.07	38.93

The method of analysis must of course be invariably the same and the figures obtained apply strictly to the cement experimented on, though general comparisons may be made with other cements which contain more or less flux as determined by the penetration. Other things being equal, the more flux a cement contains the greater the percentage soluble in petroleum naphtha. A microscopical examination and mechanical analysis to determine the size and quality of the mineral residue should always supplement the chemical examination. The results of the tests enumerated above are sufficient in the majority of cases to indicate the cause of discrepancies in the manufacture of asphalt mixtures. A few of the more common errors to be guarded against are the following:

1. Deficiency in the amount of bitumen caused by neglect to properly proportion the mixture or from the introduction of sediment into the cement by working the tank too low.

2. Too stiff a mixture caused by overheating.

3. Too stiff or too soft a mixture caused by failure to properly proportion the amount of flux to the asphalt or the asphaltic cement to the sand.

4. Soft spots caused by failure of petroleum residuum to completely dissolve or "blend" with the asphalt.

A "superintendent of works" is not infallible, and if mistakes occur, the mixture is, as a rule, placed on the street notwithstanding, as each square yard of material must be accounted for, and to reject any would mean a loss to the company and an injury to his reputation. There is, hence, abundant opportunity for the chemist to detect errors and advise against failures, especially in the case of new and inexperienced contractors. Without data covering the points above enumerated, the engineer is usually at a loss to know whether he has the right to condemn an apparently poor mixture. With such data at his command, he is enabled to intelligently criticise the work, point out errors and dictate proportions if necessary.

The point is often made that inasmuch as the contract provides for maintenance of the pavement for five or 10 years as the case may be, the contractor should be allowed to lay the pavement without restriction as to formula. The taypayer, however, may justly claim that asphalt pavements, when laid with the best materials and under expert supervision, should last for 15 to 25 years with but few repairs necessary; that the city should not be required to enter into contracts for maintenance of pavements which rapidly disintigrate at the end of the guarantee period; and further, that he should not be compelled to submit to the inconvenience caused by the closing of streets for frequent repairs. For these reasons, if scientific control of asphalt paving by means of frequent analyses and tests secures pavements of comparatively permanent construction—and experience abundantly proves that it does—its value is readily apparent.

LOW PRICE ON LIGHT.

Norfolk's new light contract with the Norfolk (Va), Railway and Light Company will go into effect the first of next month. The city will hereafter pay about a third less for its lighting per this new contract, and by the terms of this contract, the arc lights are to be turned on every night. By the terms of the contract, under which the city is now lighted, the company does not have to turn on the lights for the three full moon nights of each month provided it is clear on these nights.

For three years, from September 1st, the city will pay $58 a year for its arc lights. It has been paying $85 a year, and this big reduction was brought about by competition in bidding for the lighting contract before the Light Committee of Councils a few months ago.

For several Saturday nights in the recent past the arc lights nearly all over the city have been turned off until after midnight. It is stated that this is due to the general use throughout the city of commercial lights on Saturday nights. The power plant is not yet fully installed.

CORNING GETS CHEAPER LIGHTS.

"Cheaper lights" was the slogan of the Democratic municipal ticket of Corning, a city of about 10,000 population in Western New York, last spring. Mayor Lane and several aldermen were elected on that issue.

For the past five years the city had been lighted by the Corning Gas Company, on a moonlight schedule, at $100 per arc light, of 2,000 candle power. The contract with this company expired on June 30, 1900. The city, in making a new contract desired to change from the moonlight schedule to the all night and every night service.

When bids were advertised for there was only one bid received—that of the Corning Gas Company, which offered to take a contract at $105 for a period of five years, on an all night and every night service. The Council decided to advertise again, which it did, but with no better results, receiving only the bid of the Corning Gas Company. This was rejected.

At the same time the Council requested the Corning Gas Company to continue its service at the old rate until such a time as the city would be ready to make a new contract, or give a 90 days' notice for discontinuing the service altogether. This the company refused to do. In the meantime a resolution was introduced and passed, renewing the contract of the old company for five years. This resolution was promptly vetoed by Mayor Lane, which opened the way for another opportunity to receive bids.

This trial was more successful, for a second bid was received. Another concern offered to construct a new plant and have it in operation by the first of November, light the streets at $80 per arc light of a 2,000 candle power and give an all night and every night service, provided the city would grant a ten-year franchise. This proposition was accepted, which, it is claimed, will save the city the sum of $19,000 in the ten years.

Sewage Disposal and Water Purification.*

By John H. McClintock, A. M., C. E.

Cleanliness is next to godliness. The laws of sanitation follow closely those of morality, and are of equal value in benefiting the temporal condition of our race. If they are neglected, the people suffer and charge their unhappiness to, an over-ruling Providence, when the blame should rest on themselves, for neglecting the laws of personal and civic cleanliness.

The system for sewage disposal consists of

1. A water-tight settling or septic tank, large enough to hold from 18 to 30 hours' flow of the sewage, through which the flow is constant, but so constructed that the outlet draws neither from the top nor the bottom of the tank.

2. The effluent from the settling tank is received on the top of a coarse coke, cinder or gravel filter at the rate of one cubic yard for every 100 gallons of sewage per day. The sewage from the tank may be applied continuously or intermittantly to the filter. The filter may be used in sections, the one operating while the others aerate, or may be used as contact bacteria beds which gradually fill up, rest, and slowly discharge.

3. The discharge from the coarse filter may be received on the surface of a finer cinder or sand filter intermittantly, with at least one cubic yard of filtering material for every 300 gallons of the effluent from the bacteria bed. If one cubic yard of fine filter is provided for every 100 gallons of effluent per day, the purification should be absolute, as soon as the filters get into working order.

In other words, sewage disposal works should provide rotting or settling tanks which contain half a cubic yard of space and one cubic yard of coarse filter, and one cubic yard of fine filter for each and every inhabitant—about the amount of territory assigned for man's last resting place, the grave.

For sanitary, as well as for other reasons, it is well to protect the tank by a roof or covering and ventilate it, although the ventilation is not essential. A covering may or may not be placed over the two filters. There is no chemical or biological objection to their being covered by a layer of loam. The finer filter need not be protected; for the effluent which it received from the septic tank and bacteria bed is colorless, odorless, and tasteless. The fine filter may be omitted when the discharge is into salt water.

To explain the working of this system, it is necessary to state that bacteria of putrifaction and nitrifaction originate with the sewage. The former are known as anaerobic bacteria, which works without air and include the germs of malignant diseases. The septic tank may be likened to the stomach; and the action of the bacteria to digestion. These bacteria vastly increase in numbers under the conditions offered in the tank, do the work which nature designed them to accomplish for man's benefit, and having served their purpose, disappear. They act, during their brief existance, to disintegrate organic matter and convert it into its original inorganic elements, in some such a way as combustion. Very little of the suspended organic matter of the sewage escapes from the tank, about 10 per cent. of the dissolved organic matter, and only about 15 per cent. of the number of the bacteria which enter. Those which do escape are chiefly the amphibious or facultative bacteria which operate either with or without air and the aerobic bacteria which require air. Those which do escape become attached to the surface of the filtering material and are sustained by the dissolved impurities which come with them. The best filtering material is that which offers the best surface for the bacteria to become attached to. Charcoal or coke proves as good as any, although cinders and burnt clay are very efficient.

Some bacteria escape from the coarse filter, are arrested in the fine filter, and continue their functions of converting the dissilved impurities into plain food or inorganic elements. Doubtless there is in both of these filters a chemical as well as a biological action; for intermittant action introduces air throughout the filters; and it is impossible that the bacteria having done their work become oxydized or consumed; for certain it is that the temperature of the sewage going through the works perceptably rises.

The above theories are advanced to explain what are now recognized as well established laws of nature. As the tank is like the stomach, the bacteria beds are like the lungs of an animal, inasmuch as the air goes through the filter at regular intervals; for, as a matter of course, the system can be made to work automatically, its action depending on the bacteria of the sewage, the flow of the sewage controlling its diversion from one bed to another by as simple a mechanical device as the shut-off of a bath-room tank; while intermittant action in the fine filter is obtained by means of a syphon which slowly empties the coarse filter when it becomes thoroughly saturated.

The bacteria of the sewage as it enters the tank number about 1,000,000 to the cubic centimetre. As the sewage is brought to rest in the tank, these gradually increase to 50,000,000. It is supposed that nothing of an organic origin can withstand the action of these bacteria of putrifaction, so that it seems probable that the septic tank will finally settle the problem of garbage as well as of sewage disposal.

At the expenimental plant at Brentwood, N. H., which has been in continuous operation for five years, the septic tank is protected by an ordinary roof, and is remarkable from the fact that septic action there does not give forth offensive or noticeable odors in the building itself which, however, is ventilated into a shaft. The manurial value of the sewage may be saved and utilized as a fertilizer, as at Brentwood, if it is desirable, by constructing the tanks with partitions, the first compartment holding the bulk of solids in such quantity that putrifaction is arrested. A common precipitant like lime, will increase the deposit.

The septic tank on a large scale was first proposed for the city of Brockton, Mass., in 1887, and is thus summarized by the officials who condemned it: "A settling basin,, which without the aid of chemicals is intended to separate and retain the solid portions of the sewage; with four divisions of this apparatus to allow for cleansing; all to be covered by a building having central shaft or chimney for removing foul odors."

The next attempt to install a plant of this character was made in 1895 for the town of Andover, Mass., and consisted of "two sets of double collecting tanks and two filter beds, thoroughly underdrained, within a building ventilated through a four foot chimney 75 feet high, the effluent to have intermittant filtration out of doors, through two and one-half acres of prepared filter beds underdrained, with three feet of sand covered with three inches of loam receiving the sewage from overdrains; or such a building without out-of-door filter beds."

These tanks, as designed, would hold the flow of 24 hours and the coarse filters would receive the effluent at the rate per day of 1,000,000 gallons per acre, while the out-of-door filters would receive the effluent from the first filters at the rate of 25,000 gallons per acre per day, at the rate the sewage comes to the disposal works at Andover to-day, after the sewers have been built and in use for over two years. The system was received with the following welcome:

"The Board has carefully considered the proposed scheme, and finds that it is a thoroughly impractical one for the disposal of sewage. The settling tanks cannot be expected to remove more than a very small portion of the suspended matters. Moreover, there would be a constant flow of sewage through the proposed tank, while in the case of the experiments at Lawrence, the liquid was not disturbed. The in-door filter beds are altogether inadequate and would very quickly become clogged. The filtration area outside would receive sewage from which only a small proportion of the organic matter had been removed. No special chemical or biological difficulties attend the purification of sewage by this form of filter. An area of about six acres of open filter beds properly prepared would be sufficient for the town in the beginning, but it would be desirable to provide for increasing the area when necessary."

The principal and action of the septic tank in liquefying the solid suspended matter in the sewage was not of common or even scientific knowledge at that date, 1895, so its development must be looked for within the last five years.

The 1898 report of the Massachusetts State Board of Health published in the fall of 1899, contains a full report of the experiments carried on at the experimental station to test the workings of the septic tank and biological filters, and confirms all that was ever claimed for the system as to the degree of purification obtained. The water from the bacteria beds at times is freer from contamination than that of the Merrimack river at Lawrence, when it is pumped and filtered at the rate of 3,000,000 gallons per day to be delivered for use for domestic purposes. On account of the septic action of the tank, the filters will operate for a very long time, perhaps perpetually, because those in use for more than two years show no indication of becoming clogged. A sewage disposal plant has recently been constructed at Liberty, N. Y., where the septic tank holds from 20 to 24 hours' flow. The coarse filter received the septic tank effluent at the rate of 800,000 gallons per acre per day; and the secondary filter receives the effluent from the primary filter at the rate of 1,600,000 gallons per acre per day. The tank is covered by a concrete roof, but the filters are open. The purification effected is perfectly satisfactory to town and state authorities.

The septic tank and single filtration is in operation at Andover, Mass., and the tank reduces the area necessary for filtration from six acres demanded by the state officials to less than half an acre, and effects the most satisfactory purification of the sewage, equalling that where broad filtration is used without septic action.

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Sewage disposal works with double filtration without septic action are being constructed at Houston, Texas, but are not yet in working order.

Now to apply this principle or apparatus to the purification of water.

If the health authorities of a municipality come to the conclusion that the water furnished is a menace to the citizens and needs purification before being offered for domestic purposes, a delay in erecting a proper purification plant is almost criminal. Officials should act quickly and not stop to experiment. An experimental station has been conducted by the Commonwealth of Massachusetts from 1887 up to the present time; and the results of the experiments in the use of various materials in the purification of water are given in full in the exhaustive reports of the Massachusetts State Board of Health for the years 1890 to 1898 inclusive, which are probably on file in the nearest public library, and which should be, if they are not, in the library of every city engineer.

When one first draws water through an iron water main, there is present in the water unmistakable evidence of iron and iron rust, which however, soon disappears. If there were not a cessation of chemical action, the iron mains for water or sewage would soon become disintegrated, instead of lasting a century or more, when not exposed to the air or to electricity. The theory which explains the long life of the iron water main is that its surface becomes lined with bacterial life which not only protects the surface but purifies to a certain extent the water passing through. The principle of the filter is that the surface of the filtering material becomes coated with bacterial life; and that filter is best which is best calculated to hold and maintain bacteria. Bacteria are present in the water when there is any pollution, and originate from putrifaction or fermentation from animal or vegetable sources.

The poorest filtering material known is glass or glazed pottery; the best is charcoal or coke. The bacteria find it difficult to cling to the former, while the latter offers an ideal surface. It may be possible that charcoal or coke is the best because of the minute air spaces which they contain. Next in value to coke are cinders, screened to separate the ash; and then comes burnt clay or broken brick. Sand and gravel come nearer to glass than to coke. Generally where an artificial filter is to be constructed near a city, cinders are the most economical, for they have no value except for filling and road ballast, and can be run through a crusher and sorted by a rotary seive to the most advantageous sizes. The finer the filtering material, the more extensive the surface for maintaining bacterial life, and also the more liable to become clogged; on the other hand, the coarser the material, the less the surface, but the longer the life of the filter, because there is less likelihood of its becoming clogged. Sand is perhaps the most frequently used for a filter because it is the most available. One should be able to purchase from the contractor a cubic yard of coal ashes for 10 cents, and sifted cinders, sorted as to sizes, should not cost over 50 cents a cubic yard. If the ashes were taken from the manufacturing establishments of the city, the necessary amount could be quickly gathered. There is very little organic impurity in the ashes, and what there might be the filter when in operation would quickly disintegrate and convert into harmless elements. Straining alone does not remove dissolved organic impurities, nor a harmful germ, from the water.

To filter river water, one should take advantage of three natural laws. First, that of the sedimentation, as it comes to rest in a settling tank where suspended matter might rise to the surface or sink to the bottom. It would be well to arrange this tank in long and narrow channels, from each of which the supply could be shut off for the purpose of cleansing.

Secondly, it would be advisable, if there is much suspended matter in the water, to strain the effluent from these channels perhaps laterally through a three-foot wall of fine coke or cinders continuously, so that the anaerobic bacteria could get in their work.

Thirdly, the clarified water from the coke filter might be collected and periodically discharged on the surface of a coke or cinder, gravel or coarse sand, filter, five feet in depth, made of material that would go through a quarter-inch mesh and not through an eight-inch mesh. The surface might be flooded at each discharge, every half-hour, to a depth of six inches. In the body of the filter, there is about 20 inches air space, so that the six inches of water will be suspended by capillary attraction the whole 60 inches of the filter and be subjected to the action of three times its bulk of air while the anaerobic bacteria on the surface of the filtering material will disintegrate the organic impurities brought to them by the water. When the next body of water is poured upon the filter, the air and water already there are forced down into the underdrains, the air escaping and the water being collected to be applied intermittantly to the surface of the filter of the same dimensions as the first one, but composed of finer material, such as coke, cinders or even sand. If these filters are side by side, 2,000,000 gallons of water can be purified on one acre; but if land is valuable, the filters can be placed one above the other, so that 6,500,000 gallons can be purified on one acre per day. A timber and tar and gravel roof might be of service during the cold snaps of the winter, in northern latitudes, to protect the filters from the frost; but otherwise it would not be essential, except in some cases over the reservoir receiving the effluent from the last filter.

By this system is obtained the benefit of a settling tank and that of septic action will occur in the tank to liquefy and disintegrate suspended impurities; the straining through three feet of coke or cinders; and the double intermittant filtration of the water through 10 feet of prepared filter beds where the water is subjected twice to over three times its bulk of air, and the myriads of bacteria clinging to the surface of every grain in the bed. The lateral coke or cinder filters can be built in bays, held in place by netting and can be replaced in sections when they become clogged by river silt.

After constructing your water purification plant where necessary, let the city or town build sewage disposal works and take the sewage out of the river, lake, or harbor for the benefit and health of those dwelling on the banks. When the city has put in operation the filter and disposal works, all inhabitants living on the water shed should be warned that people are using the water for the water supply, and demand that it be kept pure and free from sewage pollution. There is common and statute law enough to protect the town from the filth of their neighbors, if anyone cares to enforce it.

If the source of water supply is reasonaly free from sewage or other contamination, single filtration is frequently all that is necessary. Where the supply is taken from a river which receives surface drainage as well as sewage, too many precautions to guard the purity of the supply cannot be taken. It is well to err on the safe side.

The system of water or sewage purification by double filtration, or by combining the settling or septic tank with the single or double filtration, permits any community to enjoy the blessing of pure water and may prevent their polluting by sewage any body of water which may be a source of water supply to their neighbors. It permits, on account of the small area necessary to be used for water or sewage purification, that the territory employed for carrying out the scheme may, above the surface, be devoted to other purposes, such as recreation grounds, parks, gardens, or lawns, and prevents what is usually an offensive operation from becoming a nuisance in any neighborhood.

The Mississippi River, the Father of Waters, with its thousands of tributaries draining a continent, is naturally the fountain of youth which De Soto sought Its water is remarkable in that it will purify itself in time, and can be carried around the world without becoming putrid under the tropical sun. As the population of the valley increases, the danger of contamination increases; and to guard the health of the people its pollution should be prohibited. True, its bulk is vast, but bacteria of disease and putrifaction have a wonderfully prolific way of increasing in numbers, as is shown on the culture plate, and the water may carry the germs of diptheria and tuberculosis as well as the typhoid, the chlorera, and the black death, the bubonic plague, and spread the scourge over the continent. Some of the germs of contageous diseases are known to withstand the rigors of a northern winter, and are revivified by the summer sun, after having been enclosed in blocks of ice. They are most active in the water when the lake is covered by its wintry coat of ice. The water shed of the great lakes, like that of the Mississippi, should be exempt from the effects of sewage pollution as far as it is practicable, and its waters should be a reservoir of the life-giving element for the use of all.

The time is approaching when the National government, as well as the state and municipal governments, must take this matter in hand, and enact laws to protect the health of American citizens, as well as their "life, liberty and pursuit of happiness," guaranteed by the Constitution, for of what value are all these without health? The interstate rivers and lakes are especially within the jurisdiction of the general government; and it is suggested that the next new member of the Cabinet should be the Secretary of the Public Health.

MUNICIPAL ASSOCIATIONS.

American Society of Municipal Improvements.

(Special to "City Government.")

The most interesting meeting in the history of the American Society of Municipal Improvements closed on August 31st, at Milwaukee. The attendance was larger—about 150 delegates—the interest greater and the result of the conclusions reached in the various discussions will be more far-reaching than at any previous convention.

The local entertainment committee covered itself with glory in caring for the visiting delegates and their wives.

While the program was not carried out in each particular as previously planned, yet there were no serious omissions. Several National organizations of a similar order are open to the charge of junketing conventions. But this charge cannot be applied to this association. This is self-evident to the man who circulates among them in the hotel corridors and in the assembly room. There is an air of sober earnestness and a business-like way about the deliberations and discussions of this association that betokens good results for American cities.

Various phases of several most important questions, such as paving, sanitation, water purification, and so forth, were thoroughly discussed after each subject had been duly presented in a carefully prepared paper. The standing committees which had been at work during the past year submitted reports of great value. "City Government" readers will be deeply interested in a few of the more important papers which appear in this number.

The society has increased its membership to nearly 100 cities. Those, not already members, will act wisely if they take immediate steps to become associated with this organization. The membership fee and annual dues are insignificant when compared with the benefits accruing therefrom.

President Thompson suggested the advisability of opening the door a little wider so as to permit those who are not city officials and yet who are deeply interested in municipal matters to become members. As a result, the executive committee submitted an amendment providing for the admission of such persons and it was adopted. The amendment follows:

Any municipality within America shall be eligible to membership in this society; likewise any engineer, officer or director who shall have charge of or supervision over or be employed as consulting engineer on any public or municipal department work. When a municipality has become a member of the society, then any person of such municipality representing any municipal board or department or any person of good standing who may be interested therein may also become a member, who is not a contractor or contracting agent. Any member who may be a member but shall have ceased to hold a position under a municipality, may retain his full membership, unless it becomes restricted under the rules. Contractors, contracting agents or dealers may become members of the society, but shall not have the privilege of voting or holding office.

The next meeting will be held at Niagara Falls in 1901.

The officers elected are as follows:

President—Robert E. McMath of St. Louis.

First Vice-President—Bernard Saunders of Toronto, Canada.

Second Vice-President—Edwin A. Fisher of Rochester, N. Y.

Third Vice-President—John L. Mason of New Bedford, Mass.

Secretary, D. L. Fulton of Allegheny, Pa.

Treasurer—F. J. O'Brien of Oswego, N. Y.

Finance Committee—William B. Howe of Concord, N. H., Julian Kendricks of Birmingham, Ala., Thomas McGilwray of Duluth, Minn.

National Municipal League.

The eighth national conference for good city government and sixth annual meeting of the National Municipal League which will be held in Milwaukee September 19 to 21, will bring together many eminent men, who have devoted much time and effort to the improvement of city government. James C. Carter, president of the League, the well-known New York lawyer, is at prsent in Scotland and Charles Richardson, a wealthy and public spirited business man of Philadelphia, who is vice-president, will preside. The program for the various sessions is announced as follows:

WEDNESDAY, SEPT. 19, 2.30 P. M.
Hotel Pfister.

First Vice-President Charles Richardson of Philadelphia, presiding.

Address of Welcome, Mayor David S. Rose.

Response, Charles J. Bonaparte of Baltimore, chairman of the Executive Committee.

A Year's Municipal Development, Clinton Rogers Woodruff, Philadelphia, secretary of the National Municipal League.

Report of Treasurer, George Burnham, Jr., Philadelphia.

Election of officers.

Municipal Accounting, M. N. Baker, New York city, associate editor "Engineering News. Discussed by James B. Cahoon, Syracuse, president National Electric Light Association, H. B. Henderson, Cheyenne, Wyo., state examiner for state of Wyoming.

WEDNESDAY, SEPT. 19, 8 P. M.
Wisconsin Night—Pabst Theatre.

Captain I. M. Bean, presiding.

The Model Charter and Wisconsin Cities, Hon. Joshua Stark, president Wisconsin Bar Association.

Improper Influence on Legislation by Public Service Companies, John F. Burke.

Primary Election Laws, Dr. Amos P. Wilder, editor "Wisconsin State Journal."

THURSDAY, SEPT. 20.
Hotel Pfister.

Meeting of the Executive Committee, 9 a. m.

MUNICIPAL PROGRAM SESSION,
10.30 A. M.

Charles J. Bonaparte, Baltimore, presiding.

Does the Model Charter Confer Dangerous Powers on the Mayor? Charles Richardson, Philadelphia, vice-president National Municipal League.

The Model Charter and Small Cities, Prof. Samuel E. Sparling, Madison, Wis., secretary of the Wisconsin League of Municipalities.

Representation of Different City Interests in the Council, Hon. William Dudley Foulke, Richmond, Ind.

THURSDAY, SEPT. 20, 2.30 P. M.

Vice-President Charles Richardson, presiding.

The Influence of Public Service Companies on City Government, the Rev. Dr. Washington Gladden, Columbus, member of the Columbus City Council.

The Government of the City of Glasgow, the Rev. Albert Lazenby, Chicago, recently of Glasgow.

Municipal Political Parties, Dr. Milo R. Maltbie, New York City, editor "Municipal Affairs."

THURSDAY EVENING, SEPT. 20.
At the Athenaeum, 8 o'clock.

Reception to delegates by the ladies of the Milwaukee College Endowment Association.

FRIDAY, SEPT. 21, 9.00 A. M.
Hotel Pfister.

Meeting of the Executive Committee.

FRIDAY, SEPT. 21, 10.30 A. M.

Local Transportation and Its Relation to the Welfare of the Municipality, George E. Hooker, Hull House, Chicago. Discussed by George C. Sikes, secretary of the Chicago Street Railway Commission.

The Essential Element in Good City Government, Charles J. Bonaparte, Baltimore.

The Debt Limit, Bird S. Coler, comptroller of Greater New York.

FRIDAY AFTERNOON.

Social entertainments.

FRIDAY EVENING, SEPT. 21.

Banquet at Hotel Pfister.

League of American Municipalities.

The Executive Committee of the League of American Municipalities recently had a meeting in New York to make further arrangements for the next meeting of the League, which will occur at Charleston, S. C., December 12th, 13th, 14th and 15th. Among other items of business the following subjects were selected for the program:

Dec. 12.—Boards, single-headed commissions or council committees—Should the administrative affairs of the departments of public works, water, fire, police, parks, charities and correction be conducted by boards, single headed commissions or council committees?

Dec. 13.—Garbage disposal—What has been the experience of municipalities in attempting to collect and dispose of garbage in a sanitary and economical man-

MISCELLANEOUS ADS.

HENRY P. BURGARD,
General Contractor,
Buffalo, N. Y.

E. F. MOORE,
General Paving Contractor,
Burlington, Vt.

ELISHA GREGORY,
Contractor for Drilling Artesian Wells,
60-64 Liberty St., New York.

WANTED.

The W. J. Clark Co., Salem, Ohio, will buy one large and one medium size sheet metal drawing press—second hand will do if modern and cheap.

A GAS FITTER AND PLUMBER, thoroughly competent and educated, wishes to locate in a place of five to ten thousand population and open business alone or in employ of others where good work is desired.

Address Plumber, care this office.

ner? Are the present utilization and incineration inventions satisfactory, and what does it cost to operate them.

Dec. 14.—Public water supplies—What means should a municipality employ to provide its people with an ample supply of pure water at equitable rates? Is the general use desirable? What systems of filtration are satisfactory?

Regulation of saloons—What policy is best to use in enforcing the laws pertaining to saloons?

Street paving—What are the relative merits and cost of various paving materials?

Municipal ownership of public service utility—What progress has been made in this line in the United States and Canada and with what results? What should be its limitations?

Remuneration to cities for franchise rights in, over and under public streets and alleys—What remuneration, if any, should be exacted from light, water, street railway, telephone and subway corporations, and how should it be collected?

Dec. 15.—The contract system for street improvements — Should improvements, construction of sewers, water-works, sidewalks, pavements, gradings, etc., be done under the contract system or by the municipality as the employer of day labor?

Street sprinkling and cleaning—Should it be done by the municipality or by contract? What system gives the best satisfaction?

Public bathhouses? Public band concerts—Should they be given at the expense of the municipality?

The special assessment for public improvement—How should assessments be levied? What portion of the cost of public improvements should be assessed against property benefited, and what portions should be paid from the general taxes? How should the cost of improvements at street intersections be assessed, or should it be paid from the general taxes?

The fire departments of our cities; their progress and their needs. Uniformity of municipal accounting. The best method for the assessment and collection of taxes and the limitation on the taxing and debt-creating powers of municipalities.

National Civic Federation.

The managers of the Civic Federation of Chicago, an organization devoted to the improvement of municipal government in Chicago, have decided to enlarge the scope of the organization and to make it national. To this end a large number of leading men throughout the country has been induced to join the movement and do what they can to make it a success.

The object in view is clearly set forth in one of the sections of the constitution of the National Civic Federation. It is "to provide for the study and discussion of questions of national import affecting either the foreign or domestic policy of the United States, to aid in the crystalization of the most enlightened public sentiment of the country in respect thereto, and when desirable to promote necessary legislation in accordance therewith."

Standing committees have been appointed on foreign relations, insular affairs, banking and currency, industrial combinations, interstate and foreign commerce, consular and diplomatic service, military and naval affairs, labor, education, immigration, municipal government, taxation, civil service, Indian affairs, and the negro question.

The work of the federation will be free from partisanship. There will be no attempt to promote the interests of any party or the views that any party may represent. What is aimed at is a discussion that will bring to light right views on public questions and consequently bring about right action on them. It is expected, therefore, that the federation will have a large membership. Already are to be found among the men supporting it leaders in all fields of thought and action. Among these are, Charles Dudley Warner, Richard T. Ely, Samuel Gompers, Franklin MacVeagh, J. Sterling Morton, Woodrow Wilson, Archbishop Ireland, Bishop Charles H. Fowler, John H. Reagan, Albert D. Shaw, Charles S. Fairchild, William C. Cornwall, Clifton R. Breckinridge, Abram S. Hewitt, James B. Angel, Daniel C. Gilman, John Bassett Moore, Theodore S. Woolsey, Bishop Potter, Felix Adler, S. N. D. North, Frederick W. Holls, T. Jefferson Coolidge, Clark Howell, William F. Dodge, Robert Treat Paine, William F. Vilas, St. Clair McKelway and Don M. Dickinson.

The first national conference will be held in Central Music Hall, Chicago, on September 24th, 25th, 26th and 27th. The subjects to be discussed on that occasion will be imperialism, money and trusts. Another conference will be held at a place not yet selected for the discussion of industrial arbitration, taxation and municipal ownership.

PHENOMENAL SUCCESS OF THE BARDWELL VOTOMETER IN NORTH AMPTON, MASS.—RETURNS FROM SEVEN WARDS, IN FULL, IN SEVEN MINUTES AFTER THE POLLS CLOSE—IN BLANK VOTES, SEVENTY PER CENT. SHOWN IN FAVOR OF THE BARDWELL VOTOMETER OVER THE AUSTRALIAN SYSTEM.

The city officials and voters of Northampton, Mass., were pleased and surprised at the simplicity of the Bardwell Voting Machines used in the special city election Aug. 28. A prominent fact in connection with the voting was that the laboring class, with whom they expected more or less difficulty, voted with the readiness of the most intelligent. Voters who were timed, without their knowledge, occupied from 10 to 20 seconds.

The fact that inaccuracy is impossible and that the mechanism is perfect can be vouched for by Mayor John L. Mather who writes the following letter, dated Northampton, Mass., Aug. 29th, 1900:

The Bardwell Votomer Company:

Gentlemen—Your voting machines that were used at our special election, which occurred yesterday, were a grand success. The voters had no difficulty in voting on the machines. The machines worked perfectly all day and accuracy and promptness with which the returns were received gave universal satisfaction. Very truly yours,

(Signed.) JOHN L. MATHER,
Manager.

QUICK RETURNS.

The machine contains a separate register for each candidate and the total can be obtained as soon as the polls close, which was testified to in the marvelous rapidity with which the returns were received. In Ward One the returns were in the hands of the City Clerk Clapp three minutes after the polls closed. The average time consumed in hearing from each of the seven wards of the city was less than four minutes, and according to the statement of Mr. Clapp, the full returns from the seven wards in the city were in his hands seven minutes from the time the polls closed.

LESS BLANK VOTES.

Under the Australian system the loss of votes through the inaccuracy of marking was necessarily large but the change made by Mr. Bardwell from marking the ballot to the simple act of turning a key half way around had made the ratio of loss comparatively small, which we note in Mr. Clapp's letter to the Bardwell Votometer Co. As Mr. Clapp was in position to criticise the general and minute points in the voting machine we take great pleasure in giving you his opinion in full:

August 29, 1900.

Mr. John S. Fillmore, Manager Bardwell Votometer Company, New York City:

Dear Sir—The Bardwell Votometer used in our special election of yesterday gave perfect satisfaction in every respect and worked with absolute accuracy. The act of voting is so simplified in the admirable operation of this machine that any person of ordinary intelligence can vote by turning the key and his vote will be accurately counted.

The great loss of votes under the Australian system, through inaccuracy in marking, cannot prevail with the Votometer in any contingency as every action on the machine is absolute and exact.

In blank votes, comparing with previous elections under the Australian system, my records show 70 per cent. in favor of the Bardwell Votometer.

The returns from the seven wards in the city, including the five mile out polling place, were in my office, in full, within seven minutes from the time the polls closed.

I have made the foregoing statement from personal observation and knowledge, in my official capacity in charge of elections and from the feeling that the excellence of the Bardwell Votometer should be acknowledged.

Yours truly,

(Signed.) EDBERT I. CLAPP,
City Clerk.

Mr. Clapp also said:—"The matter of receiving the returns was greatly simplified as well as expedited. The cost in using the machine would be much reduced; a great saving being made in not having to print 10,000 ballots, and not nearly as many election officers being required."

Commissioner Hogan, who had been requested, by Mayor Hart of Boston "That the members of the Commission examine several other voting machines and were to make a report on the first of September." He states "that none of the other machines he had seen worked so simply as the Bardwell Votometer." He considered this machine a wonder.

Mr. Bardwell, the inventor, has been very careful to bring the machine to a high degree of perfection before placing it before the public and his first genuine trial has demonstrated that it is all he claims it to be.

Mr. Fillmore, manager of the "Bardwell Votomer Company," Park Row Bldg., New York City, will be pleased to answer any inquiries and stands ready to demonstrate to the public the superior features of their machine.

WHEN TO ADVERTISE.

There are business establishments which cut down their advertising in dull seasons. Others follow the course of a successful manufacturer, who says: "When trade falls below its normal activity I either increase my advertising or else enliven it with special offers. In dull times, as in busy, there is patronage to be gained by advertising, and I want it most when business is slack. A small gain then is as grateful as a larger one when trade is brisk."

DEPARTMENT OF INQUIRY.

The Editor of "City Government" will undertake to furnish, through this department, replies to all inquiries pertaining to municipal affairs sent in by subscribers.

WANTS ELECTION HOUSES.

Editor of "City Government:"

Camden, N. J., August 21, 1900.

Will you kindly inform me of the names of makers of election houses, such as cities using them are compelled to place in streets where houses are too small to accommodate the election machinery. I refer to the galvanized iron affairs which are commonly used.

Holding myself in readiness to reciprocate for any information you may give me. I remain, H. C. KRAMER, City Clerk.

Answered by letter, giving addresses.—[Editor.

WANTS AUXILIARY HEATERS.

New Orleans, August 3, 1900.

Editor of "City Government:"

Would you please let me know the names of manufacturers or dealers in small auxiliary heaters for steam fire engines suitable to burn coal.

B. P. Sullivan, Chairman of Apparatus Committee.

Answered by letter, giving addresses.—[Editor.

BRADFORD TAXES TELEPHONE POLES.

Bradford, Pa., August 14, 1900.

Editor of "City Government:"

Replying to the question of H. A. Mason, in "Department of Inquiry" for August, relative to telephone tax, our city has an ordinance taxing telephone poles $1 per year.

EDWARD C. CHARLTON, City Clerk.

TELEPHONE PAY STATIONS PAY LICENSE.

Louisville, Ky., August 14, 1900.

Editor of "City Government:"

Replying to the inquiry of H. A. Mason in your August issue, our Council has just passed an ordinance which requires all telephone pay stations to pay a license fee of $50 per year.

This includes all the little sub-stations in drug stores, etc., as well as the larger ones.

TAX ON TELEPHONE POLES.

Youngstown, O., August 11, 1900.

Editor of "City Government:"

In reply to the question of Mr. Mason in your last issue, I would say that, by a recent ordinance, all telephone and telegraph poles are to be taxed at the rate of $1 per year. The first census of poles ever taken in this city has just been completed and shows the following results:

Western Union Telegraph Co	255
Postal Telegraph Co	100
Central Union Telephone Co	771
Sandusky Telephone Co	840
Sandusky Electric Light Co	976
Sandusky & Interurban Ry. Co	248
Peoples' Electric Ry. Co	245
Total	3,435

EXAMINATION FOR SANITARY OFFICERS.

Columbus, O., August 9, 1900.

Editor of "City Government:"

I noticed an inquiry in your August number in regard to the questions which should be answered by meat and milk inspectors. It occurred to me that your readers would, perhaps, be interested in the local civil service examination for applicants for positions on the sanitary force of our city. The questions were as follows:

1. Name at least three diseases which should require placarding.
2. Name three substances which are used as disinfectants and describe manner of proper use.
3. What object is accomplished in boiling water?
4. (a) What is a trap?
   (b) What sanitary purpose does it serve?
5. What is a catch basin?
6. What are the advantages or disadvantages of city life in its relations to health and morality?
7. State the results of overcrowded living or sleeping rooms.
8. What is the purpose of disinfection?
9. What percentage of sulphur fumes must the atmosphere of a room contain in order to be effective as a germicide?
10. What do you understand by the phrase "germs of disease?"
11. Describe a method of disinfection of a room.
12. What observations should the sanitary officer make about premises when placarding a house?
13. Make a rough drawing of these premises: A lot 50x100 feet on which there is a house, 8 rooms, a well and cistern in rear and stable on back of lot. Make drawing so that superintendent would have an idea of relative positions of buildings, well, etc.
14. Six loads of ice weigh as follows: 3,750 pounds, 3,925 pounds, 4,025 pounds, 4,165 pounds, 4,111 pounds and 4,189 pounds. How many tons of ice in the six loads?
15. (a) Multiply 789 by 362.
    (b) Divide 978 by 163.
16. (a) Where is Franklin park?
    (b) Where are the U. S. barracks?
17. Describe the route you would take and streets you would cross in going from the City Hall to the Chittenden hotel.
18. Having discovered a case of smallpox, what would be the first thing you would do?

NEW YORK'S SCHEDULE OF LICENSES

———, Ohio, August 21, 1900.

Editor of "City Government:"

Will you please give the schedule of prices charged for the various licenses in New York city?

———, City Clerk.

The following are the principal license fees charged in New York city.—[Editor.

For each public cart or truck	$2.00
For each public hack coach	3.00
For each public hack cab	2.00
For each special hack coach	5.00
For each special hack cab	3.00
For each express wagon	5.00
For each junk shop or dealer	20.00
For each dealer in second-hand articles	25.00
For each junk cart or boat	5.00
For each peddler using horse and wagon	8.00
For each peddler using pushcart	4.00
For each peddler carrying merchandise	2.00
For each ticket speculator	50.00
For each coal scalper	250.00
For each common show	25.00
For each public shooting gallery	5.00
For each public bowling alley	5.00
For each public billiard table	3.00
For each dirt cart	1.00
For each general hoisting	25.00
For each special hoisting	1.00
For each fruit stand	5.00
For each soda water stand	5.00
For each moveable newspaper stand	1.00
For each newspaper and periodical stand	5.00
For each chair of a bootblack stand	5.00
For each stand under elevated railroad stations	10.00
For each driver of any licensed vehicle	.50

SPECIAL TAXATION OF DEPARTMENT STORES IN GERMANY.

(Special Service to "City Government.")

The effort to secure the adoption of a a special taxation law relative to department stores in Germany has culminated in its adoption at the last session of the Prussian Parliament.

The provisions of the law are substantially as follows, it being premised that it applies to the Kingdom of Prussia, except the Hohenzollern Crown lands and the Island of Helgoland, and that all taxes collected under it revert to the treasury of the commune or municipality in which the store is located:

Paragraph 6 of the statute divides the merchandise to be sold into four groups, as follows::

(1) Groceries and colonial produce, food products and drinks, tobacco and manufactures thereof, smokers' articles, apothecaries' supplies, colors, drugs, and perfumery.

(2) Yarn and twine, upholstery goods, mercery, drapery; woven, knit, and embroidered goods; underclothing of all kinds, bedding and furniture of all kinds, curtains, carpets, and all material used in interior household decorations.

(3) Household, kitchen, and garden utensils and implements; stoves, glassware, porcelain, earthen and stone ware, upholstered furniture and materials thereto pertaining.

(4) Gold, silver, and other jewelry; objects of art or luxury, bric-a-brac, articles of paper or papier-mache, books and music, weapons, bicycle; articles of sport, riding, driving, and hunting; sewing machines, toys; optical, medical, scientific, or musical instruments and apparatus.

Every store, bazaar, or warehouse which shall sell articles belonging to more than one of the above groups, and of which store the aggregate sales amount to more than $95,200 per annum, shall pay a special tax graduated according to the total amount of its annual sales, as follows:

Yearly sales.	Amount tax.
$95,200 to $107,100	$952
$107,100 to $119,000	1,309
$119,00 to $130,900	1,785
$130,900 to $142,800	2,023
$142,800 to $154,700	2,261
$154,700 to $166,600	2,499
$166,600 to $178,500	2,739
$178,500 to $190,400	2,975
$190,400 to $202,300	3,213
$202,300 to $214,200	3,570
$214,200 to $226,100	4,327
$226,100 to $238,000	4,284
$238,000 to $261,800	4,760
$261,800 to $285,600	5,236

and so on for every additional $23,800 sold, $476 additional tax.

This law has been enacted for the purpose of equalizing the advantages which large bazaars, department stores, and cooperative retail establishments enjoy over the minor and middle class merchants whose business is restricted to a few articles and does not exceed a yearly turnover of $95,200. At one time during the debate, it was proposed by the House of Lords—the upper chamber of the Prussian Parliament—to exempt the stores which belong to and serve army and navy officers and civil officials; but this was denounced by the House of Deputies as an odious act of class legislation, in favor of a specially privileged caste, so that the lords were forced to yield and the law was enacted in its present form. Finance Minister Miquel, the ablest and most adroit master of taxation in Germany, who has stood as sponsor for the new act during its passage through the Diet, has issued the following declaration explaining its purpose and portraying its results when accepted in good faith and impartially enforced:

"It will depend upon the mercantile and industrial classes themselves whether this law shall fulfill for them the benevolent purpose of the lawmakers. It will be their task to promptly create and organize with self-helpful motives such associations and installations as are calculated to best increase their power

of competition with the department stores. They will have to provide, especially through the organization of purchasing and selling societies, for cheap purchases and profitable sales. They will have to stand firmly on the principle of cash purchases and sales and neither accept goods nor sell them on credit.

"In this respect also will the system of organized self-protection offer a wide field of usefulness. The State has already, through the creation of a central bank for the finances of organized guilds, done what it could properly do to promote the interests of the smaller merchants and industrial classes. It will be the task of the middle-class dealers, who have suffered from the competition of the great department stores, to improve the opportunity created by this new tax, to strengthen themselves by improved equipment and management for competition with the large establishments. The State has done its part; it now rests with the mercantile and industrial middle-classes, through intelligent, energetic self-help, to secure themselves against the competition of large capital."

TRADE NOTES.

—The Manchester Locomotive Works have received orders for rebuilding, and putting in the latest improved Amoskeag boilers, engine No. 1 of Rockland, Me., "Old Ten" of Boston, and engine No. 3 of Keene, N. H.

—The New York Filter Mfg. Co., 15 Broad street, New York, has closed a contract with Joseph Wescott & Son to construct for the East Albany Water Co. a filtration plant at Rensselaer, N. Y., of 3,000,000 gallons daily capacity.

—The Charlton Mfg. Co. has placed two new street sweepers in New Bedford, Mass., which are giving excellent satisfaction. New Bedford is setting a good example for some larger cities in being up to date in time and labor saving devices.

—Pittsburg, Pa., has contracted with the Manchester Locomotive Works for one of their latest improved double extra first size automobile Amoskeag steam fire engines. This engine is guaranteed to deliver 1,350 gallons of water in a minute, thus making it the largest guaranteed water capacity steam fire engine made in the United States. It is to be used in the congested district of down town. Engines 10 and 24 will be rebuilt with the latest inmproved boilers.

KILFYRE IN DEMAND.

The following departments in New York City have been equipped with "Kilfyre," the great dry powder fire extinguisher:

Department of Street Cleaning, Dock and Ferries, Public Buildings, Lighting and Supplies and the Department of Parks.

Rushed With Orders.

A visit to the factory of the Seagrave Company, Colombus, Ohio, the leading hook and ladder truck manufacturers of the United States, reveals the fact that their noted trussed ladders and trussed trucks are fully appreciated by the firemen and municipal officials of the country.

The following is a list of work now under way:

Versailles, Ohio, a Trussed Hook and Ladder Truck now ready for shipment; Winston, N. C., Trussed Ladders; a tenth order from St. Louis, Mo., which, by the way, always has the extension ladders equipped with Seagrave's extensible base; Flint, Michigan, a very handsome No. 89 trussed truck; Fort Collins, Colo., trussed ladders; Austin, Texas, combination hose, ladder and chemical wagon, new design with exposed tank; Augusta, Ga., hose wagon and truck load of trussed ladders; Birmingham, Ala., trussed ladders; Laramie, Wyoming, chemical engine; Cass Lake, Minn., No. 7 trussed hook and ladder truck; Eaton, Colorado, outfit of trussed ladders; Lima, Ohio, (just delivered) finest combination chemical and hose wagon ever built; Baltimore, Maryland, trussed ladders; Altoona, Pa., trussed ladders; Norfolk, Va., trussed ladders; Sacramento, Cal., trussed ladders; Wolcottsville, Ind., combination hook and ladder truck and hose wagon; Averyville, Ill., trussed hook and ladder truck; Fitchburg, Mass., trussed ladders; Minersville, Pa., trussed ladders; Charleston, N. C., trussed ladders; Charlottsville, N. Y., trussed ladders; Florence, S. C., trussed ladders; Winchendon, Mass., trussed truck frame and trussed ladders; Utica, N. Y., trussed ladders; Troy, N. Y., fifth outfit of trussed ladders; Bloomington, Ill., combination hook and ladder truck, No. 100 pattern; Macon, Ga., trussed ladders; Brainerd, Minn., trussed ladders having improved extensible base on the extension ladders; Esplen, Pa., hand hook and ladder truck with improved brake for streets with steep grades; Niagara Falls, N. Y., two hook and ladder trucks, No. 9 and No. 9 A, with all the latest improvements; South Bend, Ind., a No. 100 truck with latest improvements and equipment, including the latest improved life net; Pomeroy, Ohio, No. 1 city service hose wagon; Mount Pleasant, Iowa, No. 7 trussed hook and ladder truck, with 60 foot trussed ladders (extension) and others; Bradford, Pa., No. 1 city service hose wagon, with extra equipments; Fairmont, Minn., No. 7 trussed hook and ladder truck; Brazil, Indiana, No. 89 trussed hook and ladder truck; Norfolk & Western R. R., outfit of trussed ladders; The Jeffrey Mfg. Co., trussed ladders; Pueblo, Colo., trussed ladders; Louisville, Ky., fourth outfit of trussed ladders; La Junta, Colo., No. 1 city service hose wagon; Marietta, Ohio, outfit trussed ladders; Richwood, Ohio, trussed ladders; Bloomington, Ind., special high grade hose wagon; Worthington, Ia., hose reel; Reidsville, N. C., No. 8 trussed hook and ladder truck, No. 1 city service hose wagon; East Rutherford, Mass., trussed ladders; Omaha, Neb., fifth outfit trussed ladders; New York city, twenty-second outfit of trussed ladders.

These noted trussed goods are being made in Montreal by Seagrave & Son, who now have on hand orders as follows: Ottawa, Canada, two trussed hook and ladder trucks; Montreal, Quebec, trussed ladders; St. Cunegonde, Quebec, trussed ladders; Brockville, Ont., trussed truck and ladders; Amherst, N. S., trussed ladders, with 7 A special trussed truck.

North Baltimore, Ohio, has just put in service one of the latest improved combination hook and ladder trucks and hose wagons. Columbus, Ohio, and Salt Lake City, Utah, have recently received full-sized No. 100 trussed hook and ladder truck and chemical engine.

Perhaps the most interesting fact to firemen is that notwithstanding the great loss of firemen's lives by the breaking of ordinary ladders and other accidents incident to the business, not one fireman's life has ever been lost by the breaking of a Seagrave trussed ladder, although there are forty thousand of them in use in the country.

THE WEST SHORE RAILWAY.

This road is giving first class service from New York to Buffalo and running as it does along the Hudson river, and through the fertile Mohawk valley, it affords views seldom equaled and never excelled.

The dining and sleeping car service are among the best. It also touches all the principal cities of New York State.

Before going to New York or starting on a western trip, write or call, for full information, on C. E. Lambert, General Passenger Agent, Grand Central Station, New York City.

SOUTHERN RAILWAY.

The International Association of Fire Engineers will hold its next annual convention at Charleston, S. C., October 9, 10, 11, 1900. This will give you a chance to enjoy the popular Southern Railway route, via Washington and Charlotte. Tickets will be sold for this occason at specially reduced rates. The service offered by this route, for this occasion, will be the best on all of the Southern Railway trains. There is operated a perfect dining and sleeping car service. The lines of this road touch the principal cities of the South. For full particulars call on or address New York offices, 271 and 1,185 Broadway, Alexander S. Thweatt, Eastern Passenger Agent, 1,185 Broadway.

DELAWARE, LACKAWANA AND WESTERN RAILROAD.

If you are thinking of attending any of the many conventions in the West in September, take the Delaware, Lackawana and Western road from New York to Buffalo.

The Pullman service is thoroughly up-to-date in point of luxury, comfort and convenience.

The scenery is acknowledged to be unsurpassed along any road in America, and can be enjoyed without the usual smoke and dust, as the engines burn hard coal and the road bed is stone ballasted.

All meals are served A-la-Carte, and can not be excelled.

For full information write or call on T. W. Lee, Gen. Passenger Agent, 26 Exchange Place, New York.

INTERNATIONAL ASSOCIATION OF FIRE ENGINEERS.

CHARLESTON, S. C.
OCT. 9-12, 1900.

The Southern Railway, the popular route, via Washington, Charlotte and Columbia, will sell tickets for this occasion at special reduced rates. The services offered by this route for this occasion will be the best. On all of the Southern Railway trains there is operated perfect dining and sleeping car services, touching the principal cities of the South on its own rails. For full particulars, call on or address New York offices, 271 and 1185 Broadway. Alex. S. Thweatt, Eastern Passenger Agent, 1185 Broadway.

PEOPLE NEED REMINDERS.

Only an illegitimate business has any reason to refrain from advertising. It is a delusion that by public announcements establishments lose dignity, especially through an appearance of rivalry. Advertisers do not merely compete for an existing trade; they create new business, which benefits all in their line as well as the public. People need to be constantly reminded of the things they ought to buy and of the affairs they should attend to. Procrastination is a common weakness.

Municipal Matters Determined in Court.

Antedating Bonds.—An ordinance authorizing the issuance of bonds may provide that the same be antedated. Moller et al. vs. City of Galveston et al., 57 S. W. Rep. (Tex.) 1116.

* * *

Reconstruction of Sidewalk.—The rebuilding of a pavement, though done partly with the old material, constitutes a "reconstruction," and not merely a repair of the pavement. Levi et al. vs. Coyne, 57 S. W. Rep. (Ky.) 790.

* * *

Repairs on Streets.—The obligation to keep a street in good order necessarily involves repairs, and repairs may involve the use of new material, and this may be called "reconstruction," but it is nevertheless included in the obligation to keep the street in good order. State ex rel. City of New Orleans vs. New Orleans & C. R. Co., 28 So. Rep. (La.) 111.

* * *

Legal Services—Compensation.—Sp. Laws 1891, c. 6, sec. 11, approved March 24, 1891, abrogated the authority otherwise existing under the charter of the city of St. Paul, to compensate for legal services rendered to the city by one not a member of the regular legal department of the city. Horn vs. City of St. Paul, 83 N. W. Rep. (Minn.) 388.

* * *

City Sewage Farm—Consumption of Sewage.—Where tenants on a sewage farm belongng to a city failed to use all the sewage discharged from the city, as a consequence of which it flowed beyond the farm and damaged plaintiff's land, defendant city could not make such tenants parties defendant to a suit for the injury sustained, to enforce contribution from them, where the contract between the city and such tenants did not bind them to consume all of the sewage. Smith vs. City of San Antonio et al., 57 S. W. Rep. (Tex.) 881.

* * *

Cemeteries—Nuisance — Injunction.—The maintenance of a cemetery will not be enjoined on the ground of contamination of adjoining wells; it being a matter of public necessity, located outside the town, in a sparsely populated district; there being no other suitable place for it, except at a distance of several miles from town; it appearing that it will be very many years before it will be occupied by many bodies; no actual injury of the kind complained of being proved; and it being doubtful if such injury will ever occur, and there being ample remedy at law if it does occur. Wahl vs. Methodist Episcopal Cemetery Association of Williamstown et al., 46 At. Rep. (Pa.) 913.

* * *

Municipal Corporations—Ultra Vires Contracts—Remedy of Party in Equity.—Complainant installed and delivered to the defendant city, for municipal use, a fire alarm telegraph system, under a contract which was void because it created an indebtedness on the part of the city beyond the constitutional limit. Held, that a court of equity could not change the contract into one giving to complainant an implied franchise to maintain and operate the system for its own benefit, or authorizing a recovery by complainant of possession of the plant as an entirety, where certain of the apparatus was furnished by the city, and the wires over part of the lines were strung on poles owned by the city. Gamewell Fire Alarm Tel. Co. vs. City of Laporte, 102 Fed. Rep. (U. S.) 417.

Hon. C. W. Wiles, Delaware, O., President Central Water Works Association.

The third annual convention of the Central Water Works' Association will be held September 4 to 6, inclusive, in the city of Columbus, O.

A fine program has been arranged, and a good time promised. The latter is assured in that Mr. Alvah J. Pray, "the Pittsburg meter man," is chairman of the entertainment committee.

ORIGINALITY IN "ADS."

The art of advertising has a few fixed rules. People read "ads" not for amusement ,but to secure information; and the man who has a house, a medicine or any kind of merchandise to sell or services to offer to the public does the most essential thing when he says so, simply, directly and persistently. Still, there is always room for originality, and if he have a new idea as to how to display and arrange his annouuncements so as to arrest people's attention and make an enduring impression he is bound to profit thereby. New ideas in advertising will be in demand so long as they shall not violate the rules of simplicity and lucidity.

This Is a 36-inch VENTURI METER.

Its capacity is 20,000,000 gallons per day, or more than enough to supply a city of 200,000 inhabitants. Larger meters are in operation. Full particulars on application.

BUILDERS' IRON FOUNDRY, PROVIDENCE, R. I.

F. M. GIBSON, President.
G. EVERETT HILL, Vice-President and Manager.
M. E. STONE, Sec'y and Treasurer
WM. L. CHURCH, C. E., Engineer.

CITY-WASTES DISPOSAL COMPANY

(Organized from the Staff of the late Col. Geo. E. Waring, Jr.)

156 Fifth Avenue, New York

Consulting and Contracting in
SEWAGE DISPOSAL.
GARBAGE AND REFUSE DISPOSAL.
STREET CLEANING.

We invite correspondence with
Engineers, Commissioners, Committees, etc.

In Consultation:
CHAS. A. MEADE, C. E.
H. L. STIDHAM, C. E.
GEO. L. WALKER, C. E.
HERBERT TATE.

RECENT INVENTIONS.

—Meter connection, meter and stop-cock box. No. 654,615. Harry V. Estill, Moberly, Mo.

—Fire escapes. No. 654,705. Louis M. Boody, Hyamis, Mass.

—Fire escapes. No. 654,780. Richard D. Burchill, Grand Lodge, Mich.

—Filtering apparatus. No. 654,783. Marcellus Cole, Washington, D. C.

—Incandescent gas-lamp. No. 654,801. Mary E. Fieroe and Annie Momand, New York, N. Y.

—Water tower. No. 654,814. Fire Extinguisher Mfg. Co., New York, N. Y.

—Automatic circuit-breaker. No. 654,847. Automatic magnetic circuit-breaker. No. 654,848. Wm. M. Scott, Philadelphia, Pa.

—Electric cable. No. 654,871. Jno. Y. Buchanan, Edinburgh, Scotland.

—Tube well. No. 654,875. August D. Cook, Lawrenceburg, Ind.

—Controlling nozzle. No. 654,891. Thomas Haley, Boston, Mass.

—Lamp-post. No. 654,923. Kitson Hydrocarbon Heating and Incandescent Lighting Co., Philadephia, Pa.

—Folding voting booth. No. 654,962. Chas. Eugert, New York, N. Y.

—Electric signal and fire-alarm. No. 654,967. Michael H. Powers, Rome, N. Y.

—Cushion-tire. Nos. 655,049, 655,050. Weber G. Kendall, Providence, R. I.

—Thermostat and alarm circuit controlled thereby. No. 655,051. Carleton Electric Co., New York, N. Y.

—Sprinkling car. No. 655,129. American Car Sprinkler Co., Worcester, Mass.

—Means for securing rubber tires to vehicle-wheels. No. 655,191. Richard A. Brine, Revere, Mass.

—Pipe coupling. No. 655,204. Geo. B. Cushman and W. F. Cushman, Kansas City, Mo.

—Steam-excavator. No. 655,218. DeWilton R. French, Westport, Wash.

—Machine for making and repairing roads. No. 655,260. F. C. Austin, Chicago, Ill.

—Electric cable. No. 655,265. Geo. H. Nisbett, Huyton, England.

—Swivel pipe-joint. No. 655,315. Chas. W. Vaughan, Hillsdale, Mich.

—Autotruck for garbage, ashes, etc. No. 655,320. Jas. C. Anderson, Highland Park, Ill.

—Machine for separating rock-asphalt. No. 655,416. Jacob Phillippi, New York, N. Y.

—Dry closet and incinerator. No. 655,419. Fred P. Smith, Albany, N. Y.

—Burglar or fire alarm. No. 655,427 Franklin D. Wallace, Wheatland, Ind.

—Hose. No. 655,507. B. F. Goodrich Co., Akron, O.

—Street sign. No. 655,524. Jno. A. Sleicher, New York, N. Y.

—Fire extinguisher. No. 655,599. Jno. Braunwalder, Davenport, Ia.

—Fire-extinguisher and alarm. No. 655,776. Samuel Haltine, Greenville, Ky.

—Fire hydrant. No. 655,781. John Knickerbacker, Troy, N. Y.

—Filter. No. 655,841. Henry B. Watson, John S. Watson and Torben C. Billtop, Newcastle-upon-Tyne, England.

—Hose-tip. No. 655,879. Geo. W. Lisk, Clifton Springs, N. Y.

—Fire escape. No. 655,923. Charles O. Dutton, Lachine, Canada.

—Excavating-machine. No. 655,955. F. C. Austin, Chicago, Ill.

—Fire-shutter. No. 655,965. Peter Ebner, Columbus, Ohio.

—Street-sweeper. No. 655,971. Cornelius C. Gardner, New York, N. Y.

—Rubbish crematory. No. 655,975. James Hall, Buffalo, N. Y.

—Filter. No. 656,043. William Paterson, London, Eng.

—Composition of matter for paving roads. No. 656,094. Charles A. C. De Candemberg, Nice, France.

—Confiner of wires for electrical connections. No. 656,158. Charles F. Ash, New York, N. Y.

—Street-sweeper. No. 656,210. Alphonse Piton, Quebec, Canada.

—Street lamp. No. 656,222. Pennsylvania Globe Gaslight Co., Philadelphia, Pa.

—Device for excluding water from manholes. No. 656,249. Rudolph Herman, San Francisco, Cal.

—Alarm gong. No. 656,436. John A. Brill, Philadelphia, Pa.

—Apparatus for raising water by compressed air. No. 656,572. Julius Petermann, Crimmitzschau, Germany.

—Hose connection. No. 656,187. W. Irving Babcock, Chicago, Ill.

—Manufacture of pipes or conduits for electrical conductors. No. 656,189. Albert H. Howard, London, England.

—Road-grading machine. No. 656,317. Robert E. Burke, Anderson, Ind.

—Domestic garbage-burner. No. 656,404. Charles R. Harris, Williamsport, Pa.

THREE MONTHS FREE.

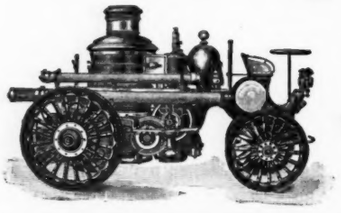
COUPLED. TRY THEM. UNCOUPLED.

We challenge the world to equal the "Quick-as-Wink" for quick, sure and reliable coupling of fire hose. Try them, they are superior to the slow old style.

THE W. J. CLARK CO., SALEM, OHIO, U. S. A.

HENION & HUBBELL, GENERAL SALES AGENTS, 69 NORTH JEFFERSON ST., CHICAGO.

Amoskeag Steam Fire ENGINES



Horse and Steam Propelling.

Manufactured by

MANCHESTER LOCOMOTIVE WORKS

Send for Catalogue to J. G. WHITNEY, Treas.

40 Water Street, BOSTON, MASS.

The American Piston and Rotary STEAM FIRE ENGINES

The Standard for Quality and Service.

2,300 ENGINES IN USE.

Also Hose Carriages and Carts, Heaters, Steam and Power Fire Pumps, and Fire Department Supplies of all kinds. Illustrated Catalogue Free on Application.

AMERICAN FIRE ENGINE CO.

Cincinnati, O. SENECA FALLS, N. Y.

The La France Fire Engine Co.

Sole Manufacturers of The LA FRANCE PISTON and ROTARY

STEAM FIRE ENGINES

..HAYES..

Patent Extension Hook and Ladder Trucks and Fire Escapes.

Heaters and Fire Department Supplies.

Send for Catalogue. ELMIRA, N. Y.